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AN EMPIRICAL ANALYSIS OF DAILY PEAK SURFACE WIND AT CAPE KENNEDY, FLORIDA FOR PROJECT APOLLO

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ABSTRACT

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A fourteen-year serially complete data sample of daily peak surface wind at Cape Kennedy, Florida was obtained from historical weather records. After adjusting speed values to a reference height of 10 meters above the ground and removing "hurricane-associated" peak winds, monthly, seasonal and annual values were computed for the following: selected percentiles and statistics; bivariate empirical percentage frequency distributions of (1) speed versus direction, (2) speed versus hour of occurrence, and (3) hour of occurrence versus direction; and exposure period probabilities (empirical percentage frequencies) of equaling or exceeding peak wind speeds of various magnitudes during consecutive-day time intervals. Use of the results is aided by specific examples and a further development of theoretical frequency distributions is proposed. This study is unique in terms of the data sample and the amount of information presented. The results can be used in many areas of research and operation.

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approximately two weeks. Wind is one such element crucial to the operation since it may induce structural loading. In general, it is not possible to predict two weeks in advance the occurrence of winds that may be hazardous to this operation. Consequently, knowledge of extreme winds and their frequency of occurrence in the Cape Kennedy area would aid in the prediction of daily peak surface wind speeds and also in determining the possibility of encountering critical structural loading for the Apollo space vehicle and/or the LUT. Since the time interval for transport and preparation of a vehicle may vary, such frequencies of occurrence would be most useful if determined for various time intervals or "exposure periods." Expressed as probabilities these values would provide a measure of the risk, as related to extreme winds, associated with a given operation. To provide such information, it was necessary to obtain observed values of daily peak surface wind speed from historical weather records.

B. DATA SAMPLE

Weather observing stations make routine hourly observations of existing surface weather. This information is recorded on a standard form (WBAN-10) and includes values for cloud cover, visibility, wind speed and direction, temperature, dew point, precipitation, sea level pressure, and altimeter setting. During certain weather conditions, observations may be required more frequently than once each hour [1]; they, too, are recorded on the WBAN-10 form.

Records are sent by each station to the National Weather Records Center (NWRC) at Asheville, North Carolina, a central archive for weather data. To acquire data for this study, the NWRC was requested to prepare[1], from all available records, a serially-complete (no missing values) data sample of daily peak surface wind speed. To meet this requirement and obtain the largest possible data sample, it was necessary to combine observations for Cape Kennedy and Patrick Air Force Base, Florida. (Because of the geographic proximity of the two stations the sample is considered to be representative of either station.) The resulting sample consisted of 5143 daily values of peak wind speed, direction, and time of occurrence for the period February 1, 1950 through March 1, 1964 with speed recorded to the nearest whole knot (nautical mile per hour), direction recorded to a sixteen-point compass scale, and time of occurrence recorded to the nearest tenth of an hour (LST). (Direction represents that from which the wind was blowing, as measured clockwise from true North.) There were 3694 values (71.83%) obtained from Cape Kennedy

[1]This serial completion and certain computations were performed under Government Order H-66040 under the supervision of the Aero-Astrophysics Office, Marshall Space Flight Center, NASA.

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SUMMARY

A fourteen-year serially complete data sample of daily peak surface wind at Cape Kennedy, Florida was obtained from historical weather records. After adjusting speed values to a reference height of 10 meters above the ground and removing "hurricane-associated" peak winds, monthly, seasonal and annual values were computed for the following: selected percentiles and statistics; bivariate empirical percentage frequency distributions of (1) speed versus direction, (2) speed versus hour of occurrence, and (3) hour of occurrence versus direction; and exposure period probabilities (empirical percentage frequencies) of equaling or exceeding peak wind speeds of various magnitudes during consecutive-day time intervals. Use of the results is aided by specific examples and a further development of theoretical frequency distributions is proposed.

I. INTRODUCTION

A. STATEMENT OF THE PROBLEM

Extreme values are of vital importance in the atmospheric sciences, especially for the establishment of engineering design criteria. This report presents an empirical analysis of the daily extremes of surface wind speed at Cape Kennedy, Florida, and should be useful in the establishment of criteria for design, launch, and operational purposes as related to aerospace vehicles. Specifically, the study was undertaken with reference to the following situation: The Project Apollo space vehicle will be assembled on a Launch Umbilical Tower (LUT) within the Vertical Assembly Building (VAB) at the Merritt Island Launch Area (MILA) at Cape Kennedy. The major engineering systems checkout will be made in the VAB before the LUT and the completed vehicle are transported by a mechanical crawler to the launch complex. Transporting and positioning the vehicle on the launch pad will require about one day[1]. After positioning, an additional period of 10 to 14 days[1] may be required to prepare the vehicle for launch. From departure at the VAB until it is launched, the space vehicle (and LUT) will be exposed to natural weather conditions for

[1]Based on Tentative Checkout Schedule, LC-39

observations and 1449 values (28.17%) obtained from Patrick AFB observations. The dates included for each station are shown in Table 1.

Data values were classified as one of three types, depending on the record source from which they were acquired. These types are defined as:

TYPE 1. Peak Gust: The highest instantaneous wind speed recorded by a continuously recording instrument during a specified period (normally, the 24-hour observational day).

TYPE 2. Observed Gust: The wind speed reported, in the absence of a continuously recording instrument, on the WBAN-10 form when the peak wind speed reached at least 8.2 m/sec (16 knots) and the variation in wind speed between the peaks and lulls was at least 4.6 m/sec (9 knots). The duration of such a gust is usually less than twenty seconds. (The peak gust is that observed during the fifteen minutes prior to observation time.) In the event that more than one observed gust was recorded for any day, the absolute maximum of these values was taken for the peak wind of that day.

TYPE 3. Hourly Wind: The wind reported for the required observation taken each hour. It is the average speed over a one-minute period before the observation time. For each day the absolute maximum of 24 hourly values was taken as the peak wind.

When more than one of the above sources was available, priority for record usage was given first to Cape Kennedy data in 1, 2, 3 order and then to Patrick AFB data in 1, 2, 3 order. A peak wind value occurring more than once in any day was included only once and assigned the earliest time of occurrence.

C. ADJUSTMENT OF THE DATA

1. Reduction to Reference Height. A review of the station history of wind equipment used at Cape Kennedy and Patrick AFB revealed that wind sensing and recording systems were of two basic types, had been moved frequently, and were located at various heights above the ground. The two systems were the AN/GMQ-1A and the AN/GMQ-11. Since response characteristics of these systems are essentially the same, wind records produced by the two systems were, for the purposes of this study, considered to be compatible.

To extract the most realistic information from the data, it was felt that all speeds should be referenced to a common height above the ground. The level of reference chosen for this study was 10 meters, the level most representative of the anemometer height for Cape Kennedy observations. The formula [2] used to convert wind speed from one level to another was

the power law

$$V_z = V_o(Z/Z_o)^p, \qquad (1)$$

where V_o is the observed speed at height Z_o above the ground, V_z is the speed at the adjusted height Z above the ground, and p is a constant. The $p = 1/7 = 0.143$ is widely used with Equation (1) for heights less than about 125 meters. For the data of this study, height ranged from 4.0 meters to 30.5 meters and the value $p = 0.143$ was considered too large for heights confined to this small range. Thus, the value $p = 0.12$ was used to adjust the data to a reference level of $Z = 10$ meters; consequently, (1) becomes

$$V_{10} = KV_o, \qquad (2)$$

where $K = (10/Z_o)^{0.12}$. Values of K and the various anemometer heights (Z_o) are given in Table 1. Thus, a peak wind speed for a height of 10 meters above the ground was obtained on multiplying an observed peak wind speed by the appropriate K value and rounding to the nearest 0.5 m/sec (1 knot). All values presented in this study were computed from peak wind speeds adjusted in this manner.

2. Hurricane-Associated Winds. In Section I.B, three types of daily peak wind observations were defined. Because of the isolated weather phenomenon known as a tropical cyclone or hurricane, it was felt that special consideration should be given to daily peak winds which might be hurricane induced. Therefore, a "hurricane-associated" wind was defined to be any one of the three types of daily peak wind observed when the center of a hurricane was within four hundred nautical miles of either Cape Kennedy or Patrick AFB. There were twenty such observations, shown in Table 2. A "hurricane-associated" wind is not to be confused with a hurricane-force wind which is defined [3] as a wind, in the Beaufort wind scale, whose speed is 32.9 m/sec (64 knots) or higher. Hurricane-force winds may occur independently of hurricanes (e.g., with a thunderstorm).

So that the data sample not be excessively biased toward peak winds of high magnitude occurring under the influence of the unique hurricane phenomenon, it was decided that all "hurricane-associated" peak winds

which equaled or exceeded 25.7 m/sec (50 knots) should be removed from the sample. To preserve the serial nature of the data, each value so removed was replaced with a 99th percentile value obtained in the following manner:

1. "Hurricane-associated" peak winds were removed from the data sample. (Only the months of September and October were involved.)

2. A frequency distribution of peak wind speed was then constructed for each of the two months from the years 1950 through 1963.

3. From each frequency distribution, 99th percentile values of peak wind speed were linearly interpolated as 21.1 m/sec (41 knots) for September and 19.0 m/sec (37 knots) for October.

Table 2 shows, under the 99th percentile column, that eight of the twenty "hurricane-associated" peak winds were replaced while four different hurricanes were involved. The other twelve values were retained as shown in the adjusted speed column. The 99th percentile daily peak wind speed indicates that, with the exception of "hurricane-associated" winds greater than 25.7 m/sec (50 knots), 1 out of every 100 daily peak winds at the 10 meter level had a speed greater than this value. Hence, with the exclusion of "hurricane-associated" peak winds, it would appear that the data sample represents the day-to-day weather pattern in the Cape Kennedy area with respect to daily peak wind speed. Extreme peak winds in the data sample are thus confined to occurrence with squall lines, thunderstorms, frontal situations, and other "normal" phenomena associated with the movement of cyclones (low pressure systems) and anti-cyclones (high pressure systems) through the Cape Kennedy area. Since such extreme winds are still included in the sample, statistics computed from the sample will be sensitive to their effect and will also be representative of the non-hurricane-associated peak winds which occurred during the fourteen-year period analyzed.

NOTE: As this report awaited publication, two hurricanes affected the Florida east coast, hurricane Cleo during the last week of August 1964 and hurricane Dora during the first week of September 1964. The peak wind speeds produced at Cape Kennedy by these hurricanes were as follows:

			Wind Speed (m/sec)	
Hurricane	Date	Height (m)	Observed	Adjusted To 10 Meter Height
Cleo	8/27/64	34	35.0	32.4
Dora	9/03/64	101	45.8	34.5

(Based on Launch Complex 34 and 37B anemometer records.)

TABLE 1

SOURCE OF DAILY PEAK SURFACE WINDS,
ANEMOMETER HEIGHT (Z_o) AND
SPEED ADJUSTMENT VALUES (K)
FEBRUARY 1, 1950 - MARCH 1, 1964

Period	Station[1]	Height (Z_o) Above Ground (m)	Speed Adjustment Value (K)
2/01/50 - 7/31/50	P	25.0	0.89640
8/01/50 - 8/16/50	C	*	
8/17/50 - 8/20/50	P	25.0	
8/21/50 - 10/16/50	C	*	
10/17/50 - 10/23/50	P	25.0	
10/24/50 - 12/18/50	C	*	
12/19/50 - 1/03/51	P	25.0	
1/04/51 - 11/30/51	C	*	
12/01/51 - 12/31/51	P	25.0	
1/01/52 - 4/21/52	C	*	
4/22/52	P	27.2	0.88764
4/23/52 - 11/30/52	C	*	
12/01/52 - 4/02/53	P	27.2	
4/03/53 - 4/30/53	P	30.5	0.87543
5/01/53 - 12/31/53	C	7.9	1.02902
1/01/54 - 3/02/54	P	30.5	
3/03/54 - 3/31/56	P	27.2	
4/01/56 - 11/18/56	P	11.0	0.98961
11/19/56 - 7/12/60	C	11.0	
7/13/60	P	4.0	1.11827
7/14/60 - 6/10/61	C	11.0	
6/11/61	P	4.0	
6/12/61 - 8/12/61	C	11.0	
8/13/61	P	4.0	
8/14/61 - 8/21/61	C	10.0	1.00000
8/22/61	P	4.0	
8/23/61 - 9/28/61	C	10.0	
9/29/61	P	4.0	
9/30/61 - 3/01/64	C	10.0	

[1] C = Cape Kennedy, P = Patrick AFB
*No height record available; assumed to be 10 m

TABLE 2

DAILY PEAK SURFACE WINDS DESIGNATED AS
"HURRICANE-ASSOCIATED"
FEBRUARY 1, 1950 - MARCH 1, 1964

Date	Type[1]	Wind Speed			99th Percentile Value	Direction[2]	Hour (LST)	Station[3]
		Height (m)	Observed (m/sec)	Adjusted (m/sec)				
9/03/50	1	10.0	35.5	35.5	21.1	SSE	13.2	C
9/04/50	3	10.0	12.9	12.9		SSE	17.5	C
9/05/50	1	10.0	14.9	14.9		SE	19.5	C
9/06/50	2	10.0	25.7	25.7	21.1	SSE	10.5	C
10/16/50	2	10.0	27.8	27.8	19.0	E	16.8	C
10/17/50	2	25.0	30.9	27.8	19.0	E	19.0	P
10/18/50	2	25.0	44.8	40.2	19.0	E	08.1	P
10/19/50	3	25.0	11.8	10.8		SW	16.7	P
10/08/53	3	7.9	10.3	10.8		ESE	06.5	C
10/09/53	2	7.9	28.8	29.9	19.0	N	17.8	C
10/10/53	2	7.9	16.5	17.0		NNW	02.5	C
9/09/60	1	10.0	13.9	13.9		E	22.9	C
9/10/60	1	10.0	28.8	28.8	21.1	ESE	23.6	C
9/11/60	1	10.0	35.0	35.0	21.1	SSE	03.7	C
10/22/63	1	10.0	14.4	14.4		NNW	19.1	C
10/23/63	1	10.0	16.0	16.0		NNW	12.1	C
10/24/63	1	10.0	14.9	14.9		W	11.4	C
10/25/63	1	10.0	7.2	7.2		WSW	11.3	C
10/26/63	1	10.0	10.3	10.3		NNW	12.8	C
10/27/63	1	10.0	9.8	9.8		NNW	11.5	C

[1] See Section I. B
[2] N = North, NNE = North-Northeast, NE = Northeast, etc.
[3] C = Cape Kennedy, P = Patrick AFB

II. ANALYSIS OF THE DATA

With the data sample adjusted as described in Section I.C, the fourteen-year period beginning February 1, 1950 and ending January 31, 1964 was chosen for analysis. This study represents the first investigation of daily peak surface winds in the Cape Kennedy area with as much as fourteen years of data available for analysis. All computed values were determined on a monthly, seasonal, and annual basis and apply to a height of 10 meters above the ground. The twelve calendar months were combined to obtain annual values, while seasonal values were obtained by combining months as follows:

WINTER: December, January, February

SPRING: March, April, May

SUMMER: June, July, August

FALL: September, October, November.

The observed values of daily peak wind speed were recorded in knots, and all frequency distributions and numerical calculations in this study were based on these original units. To comply with the MSFC system of preferred measuring units, as it pertains to linear velocity, knots have been converted to meters per second by the relationship 1 knot = 0.514791 m/sec.

A. SELECTED PERCENTILES

The observed (adjusted) values of peak wind speed were ordered from minimum through maximum and frequencies of occurrence were determined for each speed. Cumulative frequencies were then formed and selected percentile values were read directly or linearly interpolated from the resulting distributions. These values are presented in Table 3. By definition, a value X' of a variable X for which the cumulative frequency of X is equal to (p/100)N, N being the total number of X values, is called the pth percentile of X. Approximately p percent of the values of X are less than or equal to X'.

B. STATISTICS

It was also possible to obtain from the ungrouped frequency distributions values for the minimum, maximum, range (maximum - minimum), and mode. These values along with those of the arithmetic mean, standard deviation, coefficient of variation, skewness, and kurtosis are given in Table 4. The latter quantities were computed from the observed (adjusted)

values as

$$\text{mean} = \bar{X} = (1/N) \sum_{i=1}^{N} X_i, \tag{3}$$

$$\text{standard deviation} = s = \sqrt{\sum_{i=1}^{N} (X_i - \bar{X})^2/(N - 1)}, \tag{4}$$

$$\text{coefficient of variation (\%)} = \text{COV} = 100\ (s/\bar{X}), \tag{5}$$

$$\text{skewness} = [(1/N) \sum_{i=1}^{N} (X_i - \bar{X})^3]/s^3, \tag{6}$$

$$\text{kurtosis} = [(1/N) \sum_{i=1}^{N} (X_i - \bar{X})^4]/s^4, \tag{7}$$

where X_i represents a daily peak wind speed and N is the number of such observations.

The coefficient of variation expresses the sample standard deviation as a percentage of the sample mean and is a measure of relative variation. It is a dimensionless quantity which may be used to assess variability between samples. Table 4 shows that there is more variability among September peak winds (COV = 42.86%) than among May peak winds (COV = 34.09%). Relative to all other months, December (COV = 44.94%) has the most variability among daily peak winds; similarly, relative to all other seasons, Winter (COV = 42.86%) has the most variability among daily peak winds.

The values of skewness and kurtosis are included merely to indicate that the (theoretical) frequency distribution of daily peak wind speed is not normal. The skewness value is a measure of symmetry about the mean of a distribution. Symmetric distributions, such as the normal, have a skewness value of zero. A distribution with positive skewness will usually have a long tail extending in the direction of increasing magnitude,

while a distribution with negative skewness will usually have a long tail extending in the direction of decreasing magnitude. Kurtosis is a measure of the "peakedness" of a distribution, and the normal curve has a kurtosis value of three. Distributions having a kurtosis greater than three are more peaked than the normal.

The skewness and kurtosis values are not absolute measures of symmetry and peakedness since a nonsymmetrical distribution may have skewness of zero and the kurtosis value depends very much on the shape of the tails. However, these values do provide important information about a data sample and are not to be ignored. For this study they indicate sufficient departure from normality to recommend that no inferences about daily peak surface winds be made under the assumption that these values are normally distributed.

C. FREQUENCY DISTRIBUTIONS

The next step in the data analysis consisted of forming bivariate percentage frequency distributions of (1) daily peak wind speed versus the direction from which the wind occurred, (2) daily peak wind speed versus the hour during which the wind occurred, and (3) the hour during which the daily peak wind speed occurred versus the direction from which the wind occurred. For (1) and (2), frequencies were obtained for each observed speed value and then grouped by speed intervals for conversion to percentage relative frequencies. Similarly, hour-of-occurrence frequencies were combined into individual hour groups for conversion to percentage frequencies. The resulting empirical distributions are presented as Tables I, II, and III of the Appendix. Tabular values may be interpreted as percentage probabilities for the joint occurrence of a daily peak wind having the qualitative properties indicated in the top and left margins. Limits of the meter per second class intervals of Tables I and II have been "adjusted" to prevent gaps which result between successive class intervals when the class limits in knots are converted and rounded to the nearest 0.1 m/sec. Any speed falling within a meter per second class interval will, when converted and rounded to the nearest whole knot, also fall within the corresponding class interval expressed in knots. To preserve this restriction, width of the meter per second class intervals is, of necessity, unequal.

D. EXPOSURE PERIOD PROBABILITIES

An "exposure period" may be defined as a continuous time interval of duration k. For a sequence of N consecutive values, the probability of occurrence of an event A during <u>any</u> exposure period of duration $k \leq N$ is called an "exposure period probability" and may be expressed as

$$P_k(A) = N_k(A)/N_k, \tag{8}$$

where $N_k(A)$ is the number of exposure periods of duration k in which event A has occurred at least once and $N_k = N - k + 1$ is the total number of exposure periods of duration k. $P_k(A)$ actually represents the empirical relative frequency of occurrence of event A and, as such, is an estimate of the theoretical probability associated with event A. This "exposure" concept may be applied to any situation for which the event and the time interval can be defined.

As used here, the event A is the occurrence of a daily peak surface wind speed (W) which equals or exceeds, at least once, a specified magnitude (W*), i.e., $A \approx W \geq W^*$. Since the data sample consisted of daily values, exposure periods of one day through thirty consecutive days were chosen and a computer program was prepared to compute the percentage probabilities

$$P_k(W \geq W^*) = 100\ [N_k(W \geq W^*)]/N_k . \qquad (9)$$

The resulting values are presented graphically in Figure I of the Appendix where the subscript k has been dropped in labelling the ordinate of each graph. Computations were made from data covering the fourteen-year period beginning February 1, 1950 and ending January 31, 1964 with values for February 29 excluded. To allow an exposure period of thirty days to begin on the last day of January, daily peak wind speeds for February 1, 1964 through March 1, 1964 (less February 29, 1964) were added to the data sample.

It is these values which have direct application to the problem presented in Section I.A.

TABLE 3

SELECTED PERCENTILE VALUES (m/sec)
DAILY PEAK SURFACE WINDS
CAPE KENNEDY, FLORIDA
FEBRUARY 1950 - JANUARY 1964

Calendar Period	Percentile									
	1	5	10	25	50	75	90	95	99	99.9
January	3.1	4.1	4.6	6.2	8.2	11.3	13.9	16.0	18.5	22.1
February	3.6	4.6	5.1	6.7	8.2	11.3	14.9	17.0	21.1	22.1
March	4.1	5.1	6.2	6.7	8.8	11.3	15.4	17.0	21.1	27.8
April	3.6	5.1	6.2	6.7	8.2	10.8	14.4	16.5	22.1	24.2
May	4.6	5.1	5.7	6.7	8.2	10.3	12.4	15.4	19.0	25.2
June	9.2	5.1	5.7	6.2	7.7	10.3	13.4	16.5	22.1	32.9
July	3.6	4.6	5.1	6.2	7.2	9.8	12.9	16.0	21.6	24.7
August	3.6	4.6	5.1	6.2	7.2	9.8	12.9	14.9	20.6	25.7
September	3.6	4.6	5.1	6.2	7.7	11.3	14.4	18.0	21.1	22.1
October	3.6	4.6	5.1	6.7	8.2	11.8	13.9	16.0	19.0	27.8
November	3.6	4.1	4.6	6.2	7.7	10.3	12.9	14.4	20.6	28.8
December	3.6	4.1	4.6	6.2	7.7	11.3	14.4	16.0	20.6	29.3
Winter	3.1	4.1	5.1	6.2	8.2	11.3	14.4	16.5	20.1	27.3
Spring	4.6	5.1	6.2	6.7	8.2	10.8	13.9	16.5	21.6	26.8
Summer	4.1	4.6	5.1	6.2	7.7	9.8	13.4	16.0	21.6	26.8
Fall	3.6	4.6	5.1	6.2	8.2	11.3	13.4	16.0	21.1	28.8
Annual	3.6	4.6	5.1	6.2	7.7	10.8	13.9	16.5	21.1	28.8

TABLE 4

STATISTICS
DAILY PEAK SURFACE WINDS
CAPE KENNEDY, FLORIDA
FEBRUARY 1950 - JANUARY 1964

Calendar Period	No. of Obs	Minimum (m/sec)	Maximum (m/sec)	Range (m/sec)	Mode (m/sec)	Mean (m/sec)	Standard Deviation (m/sec)	COV (%)	Skewness	Kurtosis
January	434	2.1	23.7	21.6	6.2	8.9	3.7	41.57	0.76	3.21
February	395	2.6	22.7	20.1	6.2	9.4	3.9	41.49	1.00	3.59
March	434	4.1	29.9	25.8	6.7	9.7	3.8	39.18	1.34	5.47
April	420	3.6	25.2	21.6	7.7	9.4	3.6	38.30	1.50	5.63
May	434	4.1	29.9	25.8	6.7	8.8	3.0	34.09	1.78	9.11
June	420	3.6	37.1	33.5	6.7	8.8	3.8	43.18	2.25	12.10
July	434	3.1	25.2	22.1	6.2	8.4	3.6	42.86	1.76	6.70
August	434	3.6	26.3	22.7	6.2	8.2	3.5	42.68	1.84	7.23
September	420	3.1	22.7	19.6	6.7	9.1	3.9	42.86	1.28	4.38
October	434	3.1	30.4	27.3	6.2	9.3	3.7	39.78	1.22	5.74
November	420	2.1	32.9	30.8	5.1	8.5	3.5	41.18	1.60	8.97
December	434	2.6	30.9	28.3	6.2	8.9	4.0	44.94	1.38	6.18
Winter	1263	2.1	30.9	28.8	6.2	9.1	3.9	42.86	1.07	4.53
Spring	1288	3.6	29.9	26.3	6.7	9.3	3.5	37.63	1.55	6.43
Summer	1288	3.1	37.1	34.0	6.7	8.5	3.6	42.35	1.97	9.05
Fall	1274	2.1	32.9	30.8	6.7	9.0	3.7	41.11	1.35	6.02
Annual	5113	2.1	37.1	35.0	6.7	9.0	3.7	41.11	1.45	6.28

III. DISCUSSION OF THE RESULTS

The results of this study are presented in Tables 3 and 4 of Section II and Tables I, II, and III and Figure I of the Appendix. The use of these tables and figures will now be illustrated.

A. TABLE 3.

For the month of January, 99 percent of the daily peak wind speeds did not exceed 18.5 m/sec (36 knots). In Winter this value increases to 20.1 m/sec (39 knots), while on an Annual basis the value is 21.1 m/sec (41 knots). The largest 99% value is 22.1 m/sec (43 knots) for the months of April and June.

In May, 50 percent of all peak winds have not exceeded 8.2 m/sec (16 knots). Consequently, 50 percent of all peak winds in May have also exceeded 8.2 m/sec (16 knots).

The speed range of the central 50 percent of September peak winds is 5.1 m/sec (10 knots), obtained by subtracting the 25th percentile value of 6.2 m/sec (12 knots) from the 75th percentile value of 11.3 m/sec (22 knots).

On an annual basis, 90 percent of the daily peak wind speeds exceed the 10th percentile value of 5.1 m/sec (10 knots) while 10 percent of the speeds exceed the 90th percentile value of 13.9 m/sec (27 knots).

Suppose that, in terms of daily peak surface wind speed, an acceptable risk for some operation is determined to be 0.1 percent, where risk is defined in terms of percentiles with percent risk = 100 - pth percentile. It is desired to find a value of daily peak surface wind corresponding to this risk level. Table 3 offers two approaches to this problem. First, the maximum of the twelve monthly 99.9th percentile values is found to be 32.9 m/sec (64 knots) for June. If this value is chosen, a 0.1 percent risk is assured for any operation in the month of June. The same operation carried out in other months would have a smaller risk level since this value for any other month would correspond to a percentile higher than the 99.9th. Second, the Annual value of the 99.9th percentile is 28.8 m/sec (56 knots). Choice of this value assures a 0.1 percent risk for an operation that may take place at any time during the year. Comparison with monthly values indicates that the operation would have a risk level less than 0.1 percent in all months except June and December, where the risk level is, in each case, not greater than 1 percent. The latter value of 28.8 m/sec (56 knots) seems a more reasonable choice for an operation that may take place on any day of the year. This conclusion is further substantiated by noting in Table I.6 that a peak wind speed in excess of

23 m/sec (45 knots) has occurred only 0.71 percent of the time (3 observations) and in Table I.12 that a peak wind speed in excess of 23 m/sec (45 knots) has occurred only 0.92 percent of the time (4 observations).

B. TABLE 4.

The statistics of this table may be useful in many areas and are, for the most part, self explanatory. Annual values appear to be sufficiently representative of any month or season and should be adequate for most purposes. The coefficient of variation, skewness, and kurtosis were discussed in Section II.B.

C. TABLES I, II, III, AND FIGURE I.

Each of these tables is preceded by a description of the tabulated values. Certain additional information, not explicitly indicated in the description, may also be obtained from these tables as indicated below.

1. Table I. Using Table I.1 as an example, the direction from which January daily peak winds most frequently occur is North (15.67%). Adding percentages for the West through North quadrant, 47.01 percent (4.38 + 5.76 + 11.29 + 9.91 + 15.67) of January daily peak winds are seen to occur from the directions 270^{o} through 360^{o}. In this same quadrant, the percentage of time that daily peak winds exceed 10 m/sec (19 knots) may be found by adding, for the same directions, all percentages in the last six class intervals, i.e.,

W: 0.92 + 0.69 + 1.61 + 0.23 + 0.23;

WNW: 0.92 + 0.69 + 0.23;

NW: 1.15 + 3.23 + 0.46 + 0.23 + 0.23;

NNW: 2.07 + 1.61 + 0.46;

N: 2.53 + 1.84 + 1.38 + 0.23.

The resulting value is 20.94 percent.

The most frequently occuring speed values are those in the 4.9 - 7.4 m/sec (10 - 14 knots) class interval with 32.26 percent occurrence. Reference to Table 4 shows the actual modal value for January to be 6.2 m/sec (12 knots). Similarly, the median speed values (corresponding to 50.00% in the Cumulative Total column) should lie in the 7.5 - 10.0 m/sec (15 - 19 knots) class interval. Table 3 gives the median speed as 8.2 m/sec (16 knots).

2. Table II. Using Table II.15 as an example, the hour during which Summer daily peak winds most frequently occur is 1400 LST (13.74%). Adding percentages shows that 50.85 percent of Summer daily peak winds occur between the hours 1300 LST and 1700 LST. Also, adding indicates that 3.28 percent of the peak winds exceed 15.1 m/sec (29 knots) during this time interval.

3. Table III. Using Table III.17 as an example, the direction from which daily peak winds occur most frequently during the year is Southeast (11.95%). The hour of most frequent occurrence is 1500 LST (10.23%). Between the hours of 1300 LST and 1800 LST during the year, 22.37 percent of the daily peak winds occur in the East through South quadrant (90^{o} through 180^{o}).

4. Figure I. Using Figure I.17 as an example, the probability is 57.9 percent that a daily peak wind speed will equal or exceed 15.4 m/sec (30 knots) at least once during any fifteen consecutive days of the year. The corresponding probability for consecutive three-day periods is 17.9 percent. For thirty-day exposure periods, the probability of equaling or exceeding 36.0 m/sec (65 knots) at least once is 0.6 percent.

Peak wind speeds of 10.3 m/sec (20 knots) or greater occur on any day of the year with a probability of 31.0 percent (one-day exposure period). Consequently, daily peak wind speeds less than 10.3 m/sec (20 knots) occur on any day with a probability of 100.0 - 31.0 = 69.0 percent, a value which may also be obtained from the Cumulative Total column of Table I.17 or Table II.17.

IV. CONCLUSION

From historical weather records, information about daily peak surface wind at Cape Kennedy, Florida has been obtained in the form percentage probabilities (relative frequencies), percentiles, and statistics. Although empirical in nature, i.e., based solely on past observation, the results of this study indicate the pattern which daily peak surface winds may be expected to follow in the future. For the design and operation of aerospace vehicles, this information can be applied to any problem in which daily peak wind is a factor influencing the final decision.

This study represents the first and only analysis of daily peak surface wind speed in the Cape Kennedy area. (See Reference 4 for an analysis based on hourly observations of surface wind.) The fourteen-year serially complete data sample used in the analysis is unique and has been obtained through a thorough examination of all official surface weather records for Cape Kennedy and Patrick AFB. Differences in record source and changes in anemometer equipment and height distract from the purity of the data sample, regardless of its size and uniqueness. Unfortunately, there was no choice but to accept such factors and try, within the realm of study, experience, and reason, to transform the data into a more homogeneous, yet representative sample. Thus, the adjustments of Section I.C were employed before analyzing the data.

To obtain representative and homogeneous wind measurements which may be used in future investigations for the Cape Kennedy area, it is strongly recommended that a permanent wind recording program be established at Cape Kennedy to operate for at least 10 years using the same type equipment, maintenance schedules, recording procedures, and data record filing system. Only in this manner can consistent and unbiased information be obtained from wind measurements.

After an empirical study involving frequency distributions, there is usually good indication of the theoretical frequency distribution obeyed by the variable under study; that is, a histogram or frequency polygon shows whether the data may reasonably conform to a symmetric, skewed, or multi-modal (either symmetric or skewed) theoretical frequency curve. Theoretical results are desirable because large masses of data can usually be summarized by the computation of a few parameters and/or statistics, and because probability tables exist for the theoretical frequency distributions most frequently encountered.

Therefore, this study will, in the near future, be extended by obtaining parameters for the appropriate theoretical frequency distributions of daily peak surface winds at Cape Kennedy.

REFERENCES

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2. Thom, H. C. S., "Frequency of Maximum Wind Speeds," Volume 80, Proceedings, American Society of Civil Engineers, New York, 1954.

3. Huschke, Ralph E., ed. Glossary of Meteorology, American Meteorological Society, Boston, 1959.

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A P P E N D I X

PERCENTAGE FREQUENCY DISTRIBUTIONS
DAILY PEAK SURFACE WIND
CAPE KENNEDY, FLORIDA
FEBRUARY 1950 - JANUARY 1964

TABLE I: SPEED VERSUS DIRECTION

I. 1.	January
I. 2.	February
I. 3.	March
I. 4.	April
I. 5.	May
I. 6.	June
I. 7.	July
I. 8.	August
I. 9.	September
I. 10.	October
I. 11.	November
I. 12.	December
I. 13.	Winter
I. 14.	Spring
I. 15.	Summer
I. 16.	Fall
I. 17.	Annual

DESCRIPTION: Table I presents bivariate percentage frequency distributions of daily peak wind speed and direction. The value found by intersecting a wind speed row and a direction column represents the percentage of time that a peak wind having the indicated magnitude and direction may be expected to occur.

Total column values represent the percentage frequency distribution of daily peak wind speed. Each value indicates the percentage of time that a peak wind may be expected to have a magnitude equal to that of the corresponding speed class interval.

Total row values represent the percentage frequency distribution of wind direction associated with the daily peak wind speeds. Each value indicates the percentage of time that a peak wind may be expected from the corresponding 16-point compass direction.

Cumulative total column values represent the cumulative percentage frequency distribution of daily peak wind speed. Each value indicates the percentage of time that a peak wind may be expected to have a magnitude less than or equal to the upper class limit of the corresponding speed class interval.

Each percentage frequency in the total row and column and the cumulative total column was obtained from a corresponding cumulative frequency and, because of rounding, may not be in exact agreement with the value obtained by adding the individual column or row percentages.

TABLE I. 1. JANUARY (434 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤ 4.8	≤ 9	0.69	0.69	1.38	0.46	0.92	0.69	1.38	0.46	1.15	0.46	0.00	0.46	0.00	0.46	0.92	0.46	10.60	10.60
4.9 - 7.4	10 - 14	4.84	2.07	2.30	0.69	1.84	1.38	2.07	2.30	2.53	1.38	2.30	0.46	0.23	2.76	2.53	2.53	32.26	42.86
7.5 - 10.0	15 - 19	4.15	1.38	0.92	0.00	1.84	1.15	1.15	0.92	1.61	0.46	1.84	1.15	0.46	0.69	2.53	2.76	23.04	65.90
10.1 - 12.6	20 - 24	2.53	0.23	0.23	0.46	0.92	0.23	0.69	1.38	0.69	1.61	0.92	0.46	0.92	0.92	1.15	2.07	15.44	81.34
12.7 - 15.1	25 - 29	1.84	0.00	0.00	0.23	0.00	0.00	0.46	0.46	0.23	0.00	1.15	0.92	0.69	0.69	3.23	1.61	11.52	92.86
15.2 - 17.7	30 - 34	1.38	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.46	0.23	0.23	1.61	0.23	0.46	0.46	5.53	98.39
17.8 - 20.3	35 - 39	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.00	0.23	0.00	1.15	99.54
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	99.77
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.23	100.00
Total		15.67	4.61	4.84	1.84	5.53	3.46	5.99	5.53	6.22	4.38	6.68	3.92	4.38	5.76	11.29	9.91	100.00	

TABLE I. 2. FEBRUARY (395 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤ 4.8	≤ 9	0.25	0.00	0.25	0.25	0.51	0.51	1.27	0.76	0.76	0.25	0.00	0.00	0.25	0.51	0.25	0.51	6.33	6.33
4.9 - 7.4	10 - 14	2.78	3.04	2.28	1.52	3.29	2.28	4.05	2.53	0.76	0.76	1.77	0.76	1.27	1.27	3.29	1.27	32.91	39.24
7.5 - 10.0	15 - 19	3.29	1.01	1.01	0.51	1.27	1.27	4.56	1.52	1.27	0.76	0.76	1.27	2.28	1.52	2.03	1.01	25.32	64.56
10.1 - 12.6	20 - 24	3.04	0.76	0.25	0.00	0.25	1.27	2.53	1.52	0.51	0.00	1.27	0.00	1.01	1.52	1.27	1.52	16.71	81.27
12.7 - 15.1	25 - 29	1.52	0.00	0.25	0.25	0.25	0.00	0.76	0.25	0.76	0.76	0.25	0.76	0.76	1.01	0.76	0.76	9.11	90.38
15.2 - 17.7	30 - 34	1.01	0.25	0.25	0.00	0.00	0.25	0.25	0.00	0.00	0.25	0.51	0.51	0.25	0.25	0.25	1.01	5.06	95.44
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.25	0.25	0.25	0.76	1.01	0.25	0.00	3.29	98.73
20.4 - 22.9	40 - 44	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.25	0.25	0.00	0.00	1.27	100.00
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Total		12.15	5.06	4.30	2.53	5.82	5.82	13.42	6.58	4.05	3.04	5.06	3.80	6.84	7.34	8.10	6.08	100.00	

TABLE I. 3. MARCH (434 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤ 4.8	≤ 9	0.46	0.00	0.00	0.00	0.00	0.23	0.00	0.46	0.00	0.23	0.00	0.69	0.00	0.23	0.23	0.00	2.53	2.53
4.9 - 7.4	10 - 14	1.38	2.76	2.76	1.15	1.84	2.53	5.07	3.92	2.30	1.61	1.15	0.46	1.38	0.92	0.69	0.92	30.88	33.41
7.5 - 10.0	15 - 19	3.92	1.38	0.69	0.23	2.53	1.15	3.92	2.76	0.92	0.92	1.84	1.61	2.53	2.07	0.92	0.92	28.34	61.75
10.1 - 12.6	20 - 24	3.69	0.69	0.46	0.23	0.46	0.46	3.00	3.00	0.69	0.23	0.69	0.23	2.07	0.92	1.15	1.15	19.12	80.88
12.7 - 15.1	25 - 29	1.61	0.23	0.00	0.00	0.23	0.23	0.92	0.46	0.23	0.46	0.00	0.92	0.46	0.00	0.46	1.61	7.83	88.71
15.2 - 17.7	30 - 34	1.38	0.00	0.23	0.46	0.23	0.23	0.23	0.23	0.46	0.23	0.23	0.46	1.84	0.00	0.46	0.69	7.37	96.08
17.8 - 20.3	35 - 39	0.23	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.92	0.46	0.23	2.53	98.62
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.69	99.31
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.00	0.00	0.69	100.00
Total		12.67	5.07	4.15	2.07	5.53	5.07	13.13	11.06	4.61	3.69	4.15	4.61	8.99	5.07	4.38	5.76	100.00	

TABLE I. 4. APRIL (420 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤ 4.8	≤ 9	0.00	0.00	0.48	0.00	1.19	0.00	0.24	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	2.14	2.14
4.9 - 7.4	10 - 14	1.19	0.48	2.38	1.90	4.52	6.19	5.00	1.67	0.95	1.19	0.71	0.71	1.43	0.95	0.48	1.67	31.43	33.57
7.5 - 10.0	15 - 19	3.33	1.67	1.90	1.67	3.81	3.81	5.48	3.57	1.19	0.48	0.71	0.71	1.90	0.95	1.67	1.43	34.29	67.86
10.1 - 12.6	20 - 24	0.71	1.67	0.48	1.43	0.71	1.19	2.62	1.67	1.19	0.00	1.19	0.48	0.95	0.71	1.19	0.95	17.14	85.00
12.7 - 15.1	25 - 29	1.90	0.48	0.00	0.00	0.71	0.71	0.48	0.24	0.48	0.71	0.24	0.00	0.24	0.48	0.00	0.48	7.14	92.14
15.2 - 17.7	30 - 34	0.71	0.24	0.24	0.00	0.00	0.00	0.24	0.00	0.24	0.24	0.48	0.00	0.48	0.24	0.48	0.24	3.81	95.95
17.8 - 20.3	35 - 39	0.24	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.24	0.00	0.00	0.00	0.00	0.24	0.48	0.00	1.67	97.62
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.24	0.48	0.00	0.24	0.24	0.24	0.48	2.14	99.76
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.24	100.00
Total		8.10	4.52	5.48	5.00	10.95	11.90	14.76	7.14	4.29	2.86	4.05	1.90	5.48	3.81	4.52	5.24	100.00	

TABLE I. 5. MAY (434 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	0.00	0.00	0.23	0.92	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	2.07	2.07
4.9 - 7.4	10 - 14	2.07	1.38	2.30	2.07	6.22	5.76	5.30	3.00	0.92	0.69	0.92	0.69	0.46	0.46	2.30	0.69	35.25	37.33
7.5 - 10.0	15 - 19	1.38	3.23	3.69	1.38	4.15	4.84	8.29	3.00	1.38	1.61	0.69	0.46	0.69	0.46	0.46	0.23	35.94	73.27
10.1 - 12.6	20 - 24	1.61	1.38	0.46	2.53	1.84	2.53	2.07	2.07	0.46	0.23	0.23	0.46	0.23	0.23	0.46	0.46	17.28	90.52
12.7 - 15.1	25 - 29	0.00	0.00	0.23	0.23	1.84	0.23	0.46	0.00	0.23	0.23	0.00	0.46	0.00	0.00	0.00	0.23	4.15	94.70
15.2 - 17.7	30 - 34	0.69	0.23	0.23	0.46	0.23	0.00	0.23	0.23	0.46	0.00	0.00	0.46	0.46	0.23	0.00	0.00	3.92	98.62
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.46	0.46	1.15	99.77
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.77
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	100.00
Total		5.76	6.22	7.14	7.60	14.29	14.06	16.36	8.29	3.46	2.76	1.84	2.53	2.07	1.61	3.69	2.30	100.00	

TABLE I. 6. JUNE (420 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	0.00	0.00	0.24	0.95	1.19	0.24	0.48	0.24	0.00	0.24	0.24	0.00	0.24	0.00	0.00	0.24	4.29	4.29
4.9 - 7.4	10 - 14	0.24	0.95	3.10	2.14	6.43	6.67	7.38	5.95	2.38	1.19	0.24	0.24	0.95	0.24	0.24	0.48	38.81	43.10
7.5 - 10.0	15 - 19	1.43	1.19	1.90	1.67	2.38	4.52	7.38	3.10	1.19	0.71	1.19	0.71	1.19	0.00	0.48	0.48	29.52	72.62
10.1 - 12.6	20 - 24	0.48	0.48	1.43	0.24	0.71	2.38	3.81	1.19	0.71	0.48	0.95	0.71	0.48	0.24	0.24	0.24	14.76	87.38
12.7 - 15.1	25 - 29	0.24	0.24	0.24	0.00	0.00	0.00	0.48	0.71	0.95	0.48	0.71	0.24	0.95	0.48	0.24	0.24	6.19	93.57
15.2 - 17.7	30 - 34	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.48	0.48	0.48	0.24	0.00	2.62	96.19
17.8 - 20.3	35 - 39	0.24	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.24	0.00	0.00	0.48	0.48	0.24	0.48	2.62	98.81
20.4 - 22.9	40 - 44	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.48	99.29
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.24	0.24	0.00	0.71	100.00
Total		2.86	3.33	6.90	5.00	10.71	13.81	19.76	11.43	5.24	3.57	3.57	2.62	4.76	2.38	1.90	2.14	100.00	

TABLE I. 7. JULY (434 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	0.00	0.23	0.00	0.69	1.61	0.46	0.69	0.23	0.46	0.00	0.00	0.23	0.00	0.00	0.23	0.00	4.84	4.84
4.9 - 7.4	10 - 14	0.69	1.61	1.61	2.30	7.37	11.98	10.60	4.61	1.15	0.92	1.61	0.69	0.69	0.46	0.23	0.00	46.54	51.38
7.5 - 10.0	15 - 19	0.23	0.23	0.46	0.00	2.53	3.69	8.29	2.76	1.84	1.15	1.38	1.15	0.46	0.46	0.23	0.23	25.12	76.50
10.1 - 12.6	20 - 24	0.46	0.00	0.23	0.69	0.46	0.46	1.38	1.38	1.15	0.92	1.38	0.69	0.46	0.23	1.38	0.69	11.98	88.48
12.7 - 15.1	25 - 29	0.46	0.00	0.00	0.00	0.00	0.69	0.23	0.00	0.23	0.23	1.15	0.69	0.46	0.69	0.00	0.23	5.07	93.55
15.2 - 17.7	30 - 34	0.46	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.46	0.46	0.00	0.23	0.69	0.69	0.23	0.23	3.69	97.24
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.23	0.23	0.00	0.92	98.16
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.23	0.23	0.00	1.15	99.31
≥23.0	≥45	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.69	100.00
Total		2.30	2.07	2.53	3.69	11.98	17.28	21.43	8.99	5.30	3.69	5.99	4.38	3.00	3.23	2.76	1.38	100.00	

TABLE I. 8. AUGUST (434 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	0.00	0.46	0.92	0.46	1.15	0.69	0.92	0.46	0.23	0.00	0.00	0.00	0.23	0.46	0.23	0.00	6.22	6.22
4.9 - 7.4	10 - 14	0.92	2.53	5.99	4.15	12.21	7.14	5.53	2.30	2.30	1.38	1.15	0.46	0.69	0.92	0.23	0.69	48.62	54.84
7.5 - 10.0	15 - 19	0.92	0.69	2.07	0.92	2.30	2.30	4.15	2.76	1.61	0.23	1.61	0.46	0.46	0.00	0.69	0.69	21.89	76.73
10.1 - 12.6	20 - 24	0.92	0.00	0.46	0.46	0.92	1.15	1.84	1.38	1.61	0.23	1.15	0.46	0.69	0.92	0.23	0.23	12.67	89.40
12.7 - 15.1	25 - 29	0.00	0.00	0.00	0.23	0.23	0.00	0.46	0.23	0.46	0.23	0.46	0.69	0.92	0.92	0.69	0.23	5.76	95.16
15.2 - 17.7	30 - 34	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.46	0.00	1.38	96.54
17.8 - 20.3	35 - 39	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.69	0.23	0.00	2.30	98.85
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.69	99.54
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	100.00
Total		3.00	3.69	9.45	6.68	17.28	11.29	12.90	7.14	6.91	2.07	4.38	2.53	4.15	3.92	2.76	1.84	100.00	

TABLE I. 9. SEPTEMBER (420 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	0.24	0.48	1.67	0.00	1.90	0.71	0.24	0.24	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.00	5.95	5.95
4.9 - 7.4	10 - 14	1.67	1.90	3.33	3.81	9.05	6.19	5.00	1.67	1.90	0.71	0.71	0.71	0.71	0.24	0.24	0.24	38.10	44.05
7.5 - 10.0	15 - 19	1.90	1.43	2.14	1.67	3.10	3.33	2.62	1.67	0.95	0.95	0.95	0.00	0.95	0.00	0.48	0.95	23.10	67.14
10.1 - 12.6	20 - 24	1.90	0.48	1.67	1.67	2.86	1.90	2.38	0.95	0.71	0.24	0.24	0.71	1.19	0.24	0.24	0.24	17.62	84.76
12.7 - 15.1	25 - 29	0.48	0.48	0.48	1.19	0.71	0.00	0.71	0.48	0.48	0.00	0.24	0.24	0.00	0.24	0.24	0.48	6.43	91.19
15.2 - 17.7	30 - 34	0.24	0.00	1.19	0.24	0.48	0.24	0.24	0.48	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.24	3.57	94.76
17.8 - 20.3	35 - 39	0.48	0.00	0.00	0.24	0.24	0.00	0.24	0.00	0.00	0.24	0.71	0.00	0.24	0.00	0.00	0.00	2.38	97.14
20.4 - 22.9	40 - 44	0.24	0.00	0.71	0.00	0.24	0.24	0.00	0.71	0.48	0.00	0.00	0.00	0.24	0.00	0.00	0.00	2.86	100.00
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Total		7.14	4.76	11.19	8.81	18.56	12.62	11.43	6.19	4.52	2.14	2.86	1.67	3.57	1.19	1.19	2.14	100.00	

TABLE I. 10 OCTOBER (434 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	0.00	0.46	0.46	0.23	0.46	0.23	0.46	0.46	0.00	0.46	0.00	0.46	0.46	0.46	0.23	0.23	5.07	5.07
4.9 - 7.4	10 - 14	2.53	4.61	3.69	1.61	3.92	3.00	1.15	2.76	0.92	0.46	0.92	0.46	0.92	0.46	2.07	0.69	30.18	35.25
7.5 - 10.0	15 - 19	5.07	2.53	3.00	2.76	3.46	2.07	1.38	0.69	0.46	0.46	0.92	0.46	0.92	1.38	1.15	1.84	28.57	63.82
10.1 - 12.6	20 - 24	3.23	1.84	2.07	2.07	2.30	1.15	0.23	0.00	0.00	0.23	0.69	0.23	0.69	0.69	1.38	1.84	18.66	82.49
12.7 - 15.1	25 - 29	0.92	0.46	2.53	1.67	2.30	0.46	0.23	0.69	0.00	0.23	0.23	0.23	0.23	0.00	0.00	0.46	10.60	93.09
15.2 - 17.7	30 - 34	1.15	0.00	1.15	0.46	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.46	3.92	97.00
17.8 - 20.3	35 - 39	0.46	0.00	0.23	0.23	0.69	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	2.07	99.08
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.23	99.31
≥23.0	≥45	0.00	0.23	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	100.00
Total		13.36	10.14	13.36	9.22	13.36	7.14	3.69	4.61	1.38	1.84	2.76	1.84	3.69	3.00	5.07	5.53	100.00	

TABLE I. 11. NOVEMBER (420 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	0.00	0.48	0.48	0.95	1.43	1.19	0.71	0.71	1.19	0.48	0.24	0.24	1.67	0.24	0.71	0.24	10.95	10.95
4.9 - 7.4	10 - 14	2.38	1.67	2.38	1.90	3.81	2.62	4.05	2.14	1.43	0.71	0.95	0.95	1.43	0.95	3.33	2.14	32.86	43.81
7.5 - 10.0	15 - 19	4.05	1.67	2.86	2.38	3.10	2.62	0.71	0.71	0.95	0.48	0.48	0.24	0.95	0.95	3.10	2.38	27.62	71.43
10.1 - 12.6	20 - 24	4.52	0.95	1.43	1.19	1.19	0.48	0.95	0.48	0.48	0.48	0.24	0.71	0.24	0.48	1.43	2.14	17.38	88.81
12.7 - 15.1	25 - 29	1.43	0.48	0.48	0.24	0.48	0.00	0.24	0.24	0.00	0.00	0.24	0.24	0.00	0.71	0.95	1.90	7.62	96.43
15.2 - 17.7	30 - 34	0.24	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.24	0.00	0.71	1.90	98.33
17.8 - 20.3	35 - 39	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.48	98.81
20.4 - 22.9	40 - 44	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.24	0.00	0.71	99.52
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.48	100.00
Total		12.86	5.48	7.62	6.67	10.24	6.90	6.67	4.29	4.05	2.14	2.38	2.62	5.24	3.57	9.76	9.52	100.00	

TABLE I. 12. DECEMBER (434 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	1.15	0.46	2.07	1.38	0.92	1.15	0.46	0.23	1.15	0.46	0.69	0.46	0.46	0.69	0.46	0.23	12.44	12.44
4.9 - 7.4	10 - 14	6.91	1.61	2.07	0.92	2.30	0.92	1.61	3.23	1.61	0.69	0.92	2.30	0.46	0.92	3.46	3.46	33.41	45.85
7.5 - 10.0	15 - 19	2.53	0.46	0.92	0.69	0.92	0.92	0.92	0.92	0.92	0.92	0.69	0.69	0.46	1.84	2.76	3.69	20.28	66.13
10.1 - 12.6	20 - 24	1.84	1.61	0.46	0.46	0.69	0.46	0.69	1.38	0.92	0.92	0.69	0.23	0.46	0.46	3.23	2.76	17.28	83.41
12.7 - 15.1	25 - 29	1.61	0.23	0.69	0.00	1.15	0.46	0.46	0.00	0.23	0.23	0.00	0.00	0.23	1.15	1.61	1.38	9.45	92.86
15.2 - 17.7	30 - 34	0.92	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.23	1.15	0.23	0.69	3.69	96.54
17.8 - 20.3	35 - 39	0.46	0.46	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.23	0.00	0.23	2.30	98.85
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.23	99.08
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.23	0.00	0.23	0.92	100.00
Total		15.44	4.84	6.22	3.46	6.45	4.15	4.15	5.76	5.07	3.46	3.23	3.92	2.76	6.68	11.75	12.67	100.00	

TABLE I. 13. WINTER (1263 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤ 4.8	≤ 9	0.71	0.40	1.27	0.71	0.79	0.79	1.03	0.48	1.03	0.40	0.24	0.32	0.24	0.55	0.55	0.40	9.90	9.90
4.9 - 7.4	10 - 14	4.91	2.22	2.22	1.03	2.45	1.50	2.53	2.69	1.66	0.95	1.66	1.19	0.63	1.66	3.09	2.45	32.86	42.76
7.5 - 10.0	15 - 19	3.33	0.95	0.95	0.40	1.35	1.11	2.14	1.11	1.27	0.71	1.11	1.03	1.03	1.35	2.45	2.53	22.80	65.56
10.1 - 12.6	20 - 24	2.45	0.87	0.32	0.32	0.63	0.63	1.27	1.43	0.71	0.87	0.95	0.24	0.79	0.95	1.90	2.14	16.47	82.03
12.7 - 15.1	25 - 29	1.66	0.08	0.32	0.16	0.48	0.16	0.55	0.24	0.40	0.32	0.48	0.55	0.55	0.95	1.90	1.27	10.06	92.08
15.2 - 17.7	30 - 34	1.11	0.16	0.08	0.00	0.08	0.08	0.16	0.00	0.08	0.24	0.24	0.24	0.71	0.55	0.32	0.71	4.75	96.83
17.8 - 20.3	35 - 39	0.24	0.16	0.00	0.00	0.16	0.16	0.00	0.00	0.00	0.16	0.16	0.24	0.32	0.40	0.16	0.08	2.22	99.05
20.4 - 22.9	40 - 44	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.08	0.08	0.08	0.08	0.00	0.55	99.60
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.08	0.00	0.08	0.40	100.00
Total		14.49	4.83	5.15	2.61	5.94	4.43	7.68	5.94	5.15	3.64	4.99	3.88	4.59	6.57	10.45	9.66	100.00	

TABLE I. 14. SPRING (1288 Observations)

SPRING		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤ 4.8	≤ 9	0.16	0.00	0.23	0.31	0.39	0.31	0.08	0.16	0.00	0.08	0.08	0.23	0.08	0.08	0.08	0.00	2.25	2.25
4.9 - 7.4	10 - 14	1.55	1.55	2.48	1.71	4.19	4.81	5.12	2.87	1.40	1.16	0.93	0.62	1.09	0.78	1.16	1.09	32.53	34.78
7.5 - 10.0	15 - 19	2.87	2.10	2.10	1.09	3.49	3.26	5.90	3.11	1.16	1.01	1.09	0.93	1.71	1.16	1.01	0.85	32.84	67.62
10.1 - 12.6	20 - 24	2.02	1.24	0.47	1.40	1.01	1.40	2.56	2.25	0.78	0.16	0.70	0.39	1.09	0.62	0.93	0.85	17.86	85.48
12.7 - 15.1	25 - 29	1.16	0.23	0.08	0.08	0.93	0.39	0.62	0.24	0.31	0.47	0.08	0.47	0.23	0.16	0.16	0.78	6.37	91.85
15.2 - 17.7	30 - 34	0.93	0.16	0.23	0.31	0.16	0.08	0.24	0.16	0.39	0.16	0.23	0.31	0.93	0.16	0.31	0.31	5.05	96.89
17.8 - 20.3	35 - 39	0.16	0.00	0.00	0.00	0.08	0.08	0.16	0.00	0.08	0.00	0.00	0.00	0.08	0.47	0.47	0.23	1.79	98.68
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.08	0.16	0.00	0.16	0.08	0.08	0.23	0.93	99.61
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.16	0.00	0.00	0.08	0.39	100.00
Total		8.85	5.28	5.59	4.89	10.25	10.33	14.75	8.85	4.11	3.11	3.34	3.03	5.51	3.49	4.19	4.43	100.00	

TABLE I. 15. SUMMER (1288 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤ 4.8	≤ 9	0.00	0.23	0.39	0.70	1.32	0.47	0.70	0.31	0.23	0.08	0.08	0.08	0.16	0.16	0.16	0.08	5.12	5.12
4.9 - 7.4	10 - 14	0.62	1.71	3.57	2.87	8.70	8.62	7.84	4.27	1.94	1.16	1.01	0.47	0.78	0.54	0.23	0.39	44.72	49.84
7.5 - 10.0	15 - 19	0.85	0.70	1.48	0.85	2.41	3.49	6.60	2.87	1.55	0.70	1.40	0.78	0.70	0.16	0.47	0.47	25.47	75.31
10.1 - 12.6	20 - 24	0.62	0.16	0.70	0.47	0.70	1.32	2.33	1.32	1.16	0.54	1.16	0.62	0.54	0.47	0.62	0.39	13.12	88.43
12.7 - 15.1	25 - 29	0.23	0.08	0.08	0.08	0.08	0.23	0.39	0.31	0.54	0.31	0.78	0.54	0.78	0.70	0.31	0.23	5.67	94.10
15.2 - 17.7	30 - 34	0.23	0.08	0.00	0.08	0.08	0.00	0.08	0.00	0.23	0.23	0.08	0.31	0.39	0.39	0.31	0.08	2.56	96.66
17.8 - 20.3	35 - 39	0.16	0.00	0.00	0.08	0.00	0.00	0.08	0.08	0.00	0.08	0.08	0.08	0.47	0.47	0.23	0.16	1.94	98.60
20.4 - 22.9	40 - 44	0.00	0.08	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.16	0.16	0.16	0.08	0.00	0.78	99.38
≥ 23.0	≥ 45	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.16	0.00	0.16	0.08	0.00	0.62	100.00
Total		2.72	3.03	6.29	5.12	13.35	14.13	18.01	9.16	5.82	3.11	4.66	3.18	3.96	3.18	2.48	1.79	100.00	

TABLE I. 16. FALL (1274 Observations)

SPEED		DIRECTION																	
(m sec^{-1})	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤ 4.8	≤ 9	0.08	0.47	0.86	0.39	1.26	0.71	0.47	0.47	0.39	0.31	0.08	0.24	0.78	0.31	0.31	0.16	7.30	7.30
4.9 - 7.4	10 - 14	2.20	2.75	3.14	2.43	5.57	3.92	3.38	2.20	1.41	0.63	0.86	0.71	1.02	0.55	1.88	1.02	33.67	40.97
7.5 - 10.0	15 - 19	3.69	1.88	2.67	2.28	3.22	2.67	1.57	1.02	0.78	0.63	0.78	0.24	0.94	0.78	1.57	1.73	26.45	67.42
10.1 - 12.6	20 - 24	3.22	1.10	1.73	1.65	2.12	1.18	1.18	0.47	0.39	0.31	0.39	0.55	0.71	0.47	1.02	1.41	17.90	85.32
12.7 - 15.1	25 - 29	0.94	0.47	1.18	1.02	1.18	0.16	0.39	0.47	0.16	0.08	0.24	0.24	0.08	0.31	0.39	0.94	8.24	93.56
15.2 - 17.7	30 - 34	0.55	0.00	0.78	0.24	0.31	0.16	0.08	0.16	0.00	0.00	0.00	0.00	0.16	0.16	0.08	0.47	3.14	96.70
17.8 - 20.3	35 - 39	0.31	0.08	0.08	0.16	0.31	0.00	0.16	0.00	0.00	0.08	0.24	0.00	0.24	0.00	0.00	0.00	1.65	98.35
20.4 - 22.9	40 - 44	0.16	0.00	0.24	0.00	0.08	0.08	0.00	0.24	0.16	0.00	0.08	0.00	0.16	0.00	0.08	0.00	1.26	99.61
≥ 23.0	≥ 45	0.00	0.08	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.39	100.00
Total		11.15	6.83	10.75	8.24	14.05	8.87	7.22	5.02	3.30	2.04	2.67	2.04	4.16	2.59	5.34	5.73	100.00	

TABLE I. 17. ANNUAL (5113 Observations)

SPEED		DIRECTION																	
($m\ sec^{-1}$)	(knots)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cum. Total
≤4.8	≤9	0.23	0.27	0.68	0.53	0.94	0.57	0.57	0.35	0.41	0.22	0.12	0.22	0.31	0.27	0.27	0.16	6.12	6.12
4.9 - 7.4	10 - 14	2.31	2.05	2.86	2.01	5.24	4.73	4.73	3.01	1.60	0.98	1.11	0.74	0.88	0.88	1.58	1.23	35.97	42.09
7.5 - 10.0	15 - 19	2.68	1.41	1.80	1.15	2.62	2.64	4.07	2.03	1.19	0.76	1.10	0.74	1.10	0.86	1.37	1.39	26.91	69.00
10.1 - 12.6	20 - 24	2.07	0.84	0.80	0.96	1.11	1.13	1.84	1.37	0.76	0.47	0.80	0.45	0.78	0.63	1.11	1.19	16.33	85.33
12.7 - 15.1	25 - 29	1.00	0.22	0.41	0.33	0.66	0.23	0.49	0.31	0.35	0.29	0.39	0.45	0.41	0.53	0.68	0.80	7.57	92.90
15.2 - 17.7	30 - 34	0.70	0.10	0.27	0.16	0.16	0.08	0.14	0.08	0.18	0.16	0.14	0.22	0.55	0.31	0.25	0.39	3.87	96.77
17.8 - 20.3	35 - 39	0.22	0.06	0.02	0.06	0.14	0.06	0.10	0.02	0.02	0.08	0.12	0.08	0.27	0.33	0.22	0.12	1.90	98.67
20.4 - 22.9	40 - 44	0.06	0.02	0.06	0.00	0.04	0.02	0.02	0.08	0.04	0.02	0.12	0.06	0.14	0.08	0.08	0.06	0.88	99.55
≥23.0	≥45	0.00	0.04	0.04	0.02	0.00	0.00	0.00	0.00	0.04	0.00	0.02	0.08	0.08	0.06	0.02	0.04	0.45	100.00
Total		9.27	4.99	6.94	5.22	10.91	9.47	11.95	7.26	4.60	2.97	3.91	3.03	4.56	3.95	5.59	5.38	100.00	

PERCENTAGE FREQUENCY DISTRIBUTIONS
DAILY PEAK SURFACE WIND
CAPE KENNEDY, FLORIDA
FEBRUARY 1950 - JANUARY 1964

TABLE II: SPEED VERSUS HOUR OF OCCURRENCE

II. 1.	January
II. 2.	February
II. 3.	March
II. 4.	April
II. 5.	May
II. 6.	June
II. 7.	July
II. 8.	August
II. 9.	September
II. 10.	October
II. 11.	November
II. 12.	December
II. 13.	Winter
II. 14.	Spring
II. 15.	Summer
II. 16.	Fall
II. 17.	Annual

DESCRIPTION: Table II presents bivariate percentage frequency distributions of daily peak wind speed and hour of occurrence in local standard time (LST). The value found by intersecting a wind speed row and an hour column represents the percentage of time that, during the sixty-minute period beginning on the indicated hour, a peak wind from the corresponding direction may be expected to occur.

Total column values represent the percentage frequency distribution of daily peak wind speed. Each value indicates the percentage of time that a peak wind may be expected to have a magnitude equal to that of the corresponding speed class interval.

Total row values represent the percentage frequency distribution of the hour of occurrence of daily peak wind speed. Each value is the percentage of time that a peak wind may be expected during the indicated hour.

Cumulative total column values represent the cumulative percentage frequency distribution of daily peak wind speed. Each value indicates the percentage of time that a peak wind may be expected to have a magnitude less than or equal to the upper class limit of the corresponding speed class interval.

Each percentage frequency in the total row and column and the cumulative total column was obtained from a corresponding cumulative frequency and, because of rounding, may not be in exact agreement with the value obtained by adding the individual column or row percentages.

TABLE II. 1. JANUARY (434 Observations)

SPEED		HOUR (LST)																									
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.69	0.00	0.00	0.23	0.23	0.69	0.46	0.00	0.00	0.23	0.69	0.92	1.84	0.46	1.15	1.15	0.23	0.00	0.23	0.00	0.46	0.46	0.46	0.00	10.60	10.60
4.9 - 7.4	10 - 14	2.30	0.69	1.15	0.69	0.23	0.00	0.46	1.15	0.46	1.15	1.84	4.38	4.38	3.46	1.61	1.61	2.07	1.15	0.23	0.00	0.69	0.69	0.69	1.15	32.26	42.86
7.5 - 10.0	15 - 19	0.69	0.69	2.07	0.69	1.38	0.46	0.69	0.46	0.92	0.92	1.61	1.84	2.30	1.61	0.46	1.84	0.69	0.69	0.69	0.00	0.23	0.46	0.46	1.15	23.04	65.90
10.1 - 12.6	20 - 24	0.23	0.69	0.23	0.23	0.00	0.23	0.46	0.46	0.23	0.69	0.69	1.84	1.38	1.61	1.38	1.84	0.46	0.23	0.23	0.46	0.46	0.00	0.92	0.46	15.44	81.34
12.7 - 15.1	25 - 29	0.23	0.46	0.69	0.46	0.23	0.00	0.69	0.23	0.00	0.23	0.92	0.92	0.46	0.92	1.38	0.69	0.69	0.46	0.00	0.23	0.23	0.69	0.46	0.23	11.52	92.86
15.2 - 17.7	30 - 34	0.00	0.00	0.69	0.23	0.69	0.00	0.46	0.23	0.00	0.00	0.23	0.23	0.23	0.23	0.46	0.69	0.23	0.00	0.23	0.00	0.00	0.00	0.69	0.00	5.53	98.39
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.46	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.15	99.54
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.23	99.77
≥23.0	≥45	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	100.00
Total		4.15	2.53	5.07	2.53	2.76	1.38	3.23	2.53	1.61	3.23	5.99	10.37	11.06	8.53	6.45	8.06	4.38	2.53	1.61	0.69	2.07	2.53	3.69	3.00	100.00	

TABLE II. 2. FEBRUARY (395 Observations)

SPEED		HOUR (LST)																									
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	1.01	0.25	0.00	0.00	0.51	0.00	0.00	0.00	0.25	0.00	0.51	0.51	1.01	0.25	0.51	0.51	0.25	0.51	0.00	0.00	0.00	0.00	0.00	0.25	6.33	6.33
4.9 - 7.4	10 - 14	1.01	1.27	0.51	0.00	0.76	0.76	0.51	0.76	0.00	1.27	2.78	2.78	2.28	2.53	5.06	3.04	2.53	1.27	0.51	1.01	0.76	0.25	0.51	0.76	32.91	39.24
7.5 - 10.0	15 - 19	0.51	0.25	0.76	0.76	0.76	0.25	0.25	1.01	1.01	0.25	1.77	2.53	1.52	3.04	1.52	2.28	2.53	0.51	0.25	1.01	0.25	0.51	0.76	1.01	25.32	64.56
10.1 - 12.6	20 - 24	1.01	0.76	0.25	0.51	0.25	0.25	0.51	0.51	0.25	0.00	1.01	1.01	0.76	1.27	2.28	1.52	1.52	0.25	0.25	0.76	0.51	0.51	0.76	0.00	16.71	81.27
12.7 - 15.1	25 - 29	0.00	0.00	0.25	0.00	0.00	0.51	0.00	0.25	0.00	0.25	1.27	0.25	0.76	1.27	1.01	2.03	0.25	0.25	0.00	0.00	0.25	0.25	0.25	0.00	9.11	90.38
15.2 - 17.7	30 - 34	0.25	0.51	0.00	0.25	0.00	0.51	0.00	0.25	0.25	0.00	0.00	0.25	0.00	1.27	0.25	0.51	0.25	0.00	0.00	0.00	0.00	0.25	0.25	0.00	5.06	95.44
17.8 - 20.3	35 - 39	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.25	0.25	0.00	0.76	0.00	0.00	0.00	0.51	0.25	0.25	0.00	0.00	3.29	98.73
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00	1.27	100.00
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Total		3.80	3.04	2.03	1.77	2.28	2.28	1.27	2.78	1.77	2.28	7.34	7.59	7.09	9.87	10.63	10.63	7.34	3.04	1.01	3.54	2.03	2.03	2.53	2.03	100.00	

TABLE II. 3. MARCH (434 Observations)

SPEED		HOUR (LST)																									
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.23	0.23	0.46	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.23	2.53	2.53
4.9 - 7.4	10 - 14	0.92	0.69	1.15	0.46	0.23	0.92	0.00	0.46	0.69	1.61	1.84	0.92	1.61	2.53	2.53	3.00	2.07	3.69	1.84	1.15	0.23	0.92	1.38	0.00	30.88	33.41
7.5 - 10.0	15 - 19	0.23	0.69	1.15	0.46	0.46	0.46	0.69	0.46	0.69	0.46	2.07	1.38	1.61	2.30	2.30	3.46	1.84	1.61	0.69	0.69	0.92	0.46	1.38	1.84	28.34	61.75
10.1 - 12.6	20 - 24	0.69	0.46	0.46	0.23	0.46	0.23	0.46	0.46	0.69	0.23	0.92	1.38	1.38	1.84	3.00	2.07	2.30	0.00	0.46	0.46	0.23	0.69	0.00	0.00	19.12	80.88
12.7 - 15.1	25 - 29	0.23	0.00	0.00	0.69	0.00	0.46	0.00	0.23	0.00	0.92	0.00	0.23	0.46	1.38	1.15	0.46	0.00	0.00	0.69	0.23	0.23	0.00	0.00	0.46	7.83	88.71
15.2 - 17.7	30 - 34	0.69	0.00	0.46	0.00	0.00	0.23	0.23	0.23	0.23	0.00	0.69	0.23	0.00	0.46	1.61	0.00	0.46	0.00	0.00	0.92	0.23	0.23	0.23	0.23	7.37	96.08
17.8 - 20.3	35 - 39	0.00	0.23	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.46	0.00	0.00	0.46	0.23	0.46	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	2.53	98.62
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.69	99.31
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.69	100.00
Total		3.00	2.07	3.23	2.07	1.38	2.30	1.61	1.84	2.30	3.92	5.99	4.15	5.76	9.22	11.75	9.45	6.68	5.30	3.92	3.46	2.07	2.53	3.00	3.00	100.00	

TABLE II. 4. APRIL (420 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤ 4.8	≤ 9	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.24	0.24	0.48	0.00	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	2.14	2.14
4.9 - 7.4	10 - 14	1.43	0.48	0.71	0.48	0.95	0.24	0.48	1.67	1.19	1.19	1.67	1.43	2.62	2.38	2.86	3.33	1.67	1.67	1.43	0.48	0.48	0.48	0.95	1.19	31.43	33.57
7.5 - 10.0	15 - 19	0.95	0.71	0.71	0.24	0.00	0.00	0.48	0.24	1.43	2.14	2.14	2.62	2.62	3.81	2.86	3.57	1.90	1.90	0.71	1.43	0.48	0.95	1.43	0.95	34.29	67.86
10.1 - 12.6	20 - 24	0.00	0.71	0.24	0.00	0.24	0.00	0.24	0.71	0.24	0.95	1.19	1.19	0.48	1.19	1.67	2.62	1.19	1.43	0.71	0.48	0.48	0.48	0.48	0.24	17.14	85.00
12.7 - 15.1	25 - 29	0.24	0.00	0.00	0.24	0.24	0.24	0.00	0.24	0.24	0.71	0.24	0.48	0.48	0.24	0.95	1.19	0.00	0.24	0.24	0.24	0.24	0.00	0.00	0.48	7.14	92.14
15.2 - 17.7	30 - 34	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.00	0.48	0.24	0.48	0.24	0.24	0.48	0.24	0.00	0.00	0.00	0.24	0.24	0.00	3.81	95.95
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.24	0.24	0.24	0.00	0.24	0.00	0.00	0.24	0.00	0.00	0.00	0.24	0.00	1.67	97.62
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.24	0.00	0.24	0.48	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.00	0.00	0.24	0.00	2.14	99.76
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	100.00
Total		2.86	1.90	1.90	1.19	1.67	0.48	1.67	3.10	3.33	5.48	5.48	6.90	7.38	9.05	8.57	11.19	5.48	5.95	3.57	2.62	1.67	2.14	3.57	2.86	100.00	

TABLE II. 5. MAY (434 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤ 4.8	≤ 9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.46	0.23	0.00	0.46	0.46	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.07	2.07
4.9 - 7.4	10 - 14	1.61	0.46	0.46	0.23	0.46	0.46	0.00	0.92	0.92	0.69	2.07	3.00	3.46	2.30	4.38	3.69	3.23	1.84	1.15	0.69	1.61	0.69	0.23	0.69	35.25	37.33
7.5 - 10.0	15 - 19	0.92	1.15	0.23	0.00	0.00	0.23	0.23	0.46	0.69	2.07	0.69	1.61	2.30	3.69	3.46	3.46	4.84	2.53	1.15	1.38	0.92	2.53	0.46	0.92	35.94	73.27
10.1 - 12.6	20 - 24	0.46	0.23	0.46	0.00	0.00	0.00	0.23	0.00	0.00	1.15	0.46	0.92	0.92	2.30	1.84	1.84	1.15	1.61	0.46	2.07	0.46	0.46	0.00	0.23	17.28	90.52
12.7 - 15.1	25 - 29	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.69	0.23	0.46	0.69	0.92	0.00	0.00	0.00	0.46	4.15	94.70
15.2 - 17.7	30 - 34	0.00	0.00	0.23	0.46	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.69	0.23	0.00	0.00	0.69	0.23	0.46	0.00	0.46	0.00	0.00	0.00	0.00	3.92	98.62
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.46	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	1.15	99.77
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.77
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	100.00
Total		3.23	1.84	1.38	0.69	0.46	0.92	0.46	1.38	1.84	4.38	3.92	6.45	6.91	8.99	10.60	11.06	9.68	6.91	3.69	5.53	3.00	0.69	0.69	2.30	100.00	

TABLE II. 6. JUNE (420 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤ 4.8	≤ 9	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	1.19	0.48	0.24	0.48	0.48	0.24	0.24	0.00	0.00	0.24	0.00	0.00	0.00	0.24	4.29	4.29
4.9 - 7.4	10 - 14	1.43	0.24	0.71	0.24	0.24	0.24	0.00	0.48	0.48	0.24	1.67	1.67	2.14	3.57	5.00	5.00	7.14	4.05	1.90	0.71	0.48	0.71	0.24	0.24	38.81	43.10
7.5 - 10.0	15 - 19	0.24	0.48	0.71	0.00	0.48	0.00	0.24	0.24	0.48	0.48	1.19	0.95	2.62	2.86	3.57	3.10	3.57	3.33	1.19	0.95	0.95	0.48	0.71	0.71	29.52	72.62
10.1 - 12.6	20 - 24	0.00	0.00	0.48	0.00	0.24	0.24	0.00	0.00	0.24	0.24	0.24	0.48	1.43	0.71	2.14	2.14	1.90	1.67	0.48	0.71	0.71	0.71	0.00	0.00	14.76	87.38
12.7 - 15.1	25 - 29	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.24	0.24	0.24	0.24	0.00	0.00	0.95	0.48	1.19	0.48	0.71	0.24	0.48	0.24	0.24	0.00	0.00	6.19	93.57
15.2 - 17.7	30 - 34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.24	0.71	0.00	0.71	0.24	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	2.62	96.19
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.48	0.00	0.48	0.24	0.00	0.24	0.00	0.00	0.00	0.00	2.62	98.81
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	99.29
≥ 23.0	≥ 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	100.00
Total		1.67	0.95	1.90	0.48	1.43	0.48	0.24	1.19	1.67	1.19	4.52	3.81	7.38	9.52	13.10	11.90	14.52	10.00	4.05	3.33	2.38	2.14	0.95	1.19	100.00	

TABLE II. 7. JULY (434 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤ 4.8	≤ 9	0.23	0.46	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.92	0.69	1.15	0.46	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	4.84	4.84
4.9 - 7.4	10 - 14	0.69	0.69	0.46	0.23	0.00	0.23	0.23	0.00	0.92	1.15	1.61	2.53	1.38	3.46	9.22	7.37	5.53	4.38	2.53	1.15	0.46	1.38	0.23	0.69	46.54	51.38
7.5 - 10.0	15 - 19	0.23	0.23	0.00	0.00	0.23	0.23	0.00	0.23	0.92	0.23	0.46	1.38	0.69	3.23	2.76	5.76	2.76	3.00	1.61	0.69	0.00	0.00	0.23	0.23	25.12	76.50
10.1 - 12.6	20 - 24	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.69	0.23	1.38	1.15	2.07	0.00	2.76	1.61	0.69	0.69	0.00	0.00	0.23	0.00	11.98	88.48
12.7 - 15.1	25 - 29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.23	0.23	0.69	0.69	0.46	1.38	0.23	0.00	0.23	0.00	0.00	0.23	5.07	93.55
15.2 - 17.7	30 - 34	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.69	0.23	1.15	0.00	0.23	0.23	0.46	0.00	0.00	0.00	0.00	3.69	97.24
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.92	98.16
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.23	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	1.15	99.31
≥ 23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.69	100.00
Total		1.15	1.38	0.46	0.69	0.46	0.46	0.46	0.69	1.84	1.38	2.76	5.99	4.38	10.37	16.13	15.44	11.52	11.75	5.53	3.00	0.69	1.38	0.69	1.38	100.00	

TABLE II. 8. AUGUST (434 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤ 4.8	≤ 9	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.46	0.23	0.00	0.69	0.92	1.15	0.46	0.69	0.69	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	6.22	6.22
4.9 - 7.4	10 - 14	0.23	0.92	0.00	0.23	0.23	0.00	0.00	0.23	0.69	0.46	1.15	1.61	3.23	4.38	7.37	6.91	6.68	5.07	3.46	2.07	1.61	1.15	0.23	0.00	0.69	48.62	54.84
7.5 - 10.0	15 - 19	0.00	0.23	0.00	0.00	0.69	0.00	0.00	0.00	0.46	0.46	0.92	0.46	1.38	2.76	1.15	3.23	3.92	2.30	1.38	0.69	0.69	0.69	0.23	0.23	21.89	76.73
10.1 - 12.6	20 - 24	0.23	0.23	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.23	0.46	0.69	0.69	0.69	1.84	0.92	1.38	1.15	1.38	0.46	0.69	0.23	0.46	0.23	12.67	89.40
12.7 - 15.1	25 - 29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.23	0.46	0.69	1.15	1.38	0.69	0.23	0.00	0.23	0.00	0.00	0.00	5.76	95.16
15.2 - 17.7	30 - 34	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.23	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	1.38	96.54
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.92	0.23	0.46	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	2.30	98.85
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	99.54
≥ 23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.46	100.00
Total		0.46	1.61	0.00	0.69	0.92	0.00	0.46	1.38	1.38	2.07	3.92	5.53	9.45	12.67	11.98	13.13	12.21	7.83	5.30	3.00	2.76	1.38	0.69	1.15	100.00	

TABLE II. 9. SEPTEMBER (420 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤ 4.8	≤ 9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.95	0.95	0.48	0.48	0.95	0.95	0.24	0.00	0.24	0.24	0.00	0.00	0.00	5.95	5.95
4.9 - 7.4	10 - 14	1.43	1.67	0.24	0.48	0.71	0.00	0.24	0.24	0.71	1.43	1.43	1.43	3.33	5.24	4.52	3.81	3.10	2.14	1.19	1.43	0.95	1.43	0.48	0.48	38.10	44.05
7.5 - 10.0	15 - 19	0.71	0.48	0.71	1.43	0.48	0.00	0.00	1.43	0.71	0.48	0.71	0.95	1.19	1.90	2.62	1.19	2.38	0.95	0.71	0.95	0.71	0.95	0.95	0.48	23.10	67.14
10.1 - 12.6	20 - 24	0.95	1.43	0.24	0.00	0.24	0.00	0.00	0.24	0.24	0.24	0.24	0.95	1.67	2.62	1.19	1.19	1.67	1.19	1.19	0.71	0.00	0.71	0.48	0.24	17.62	84.76
12.7 - 15.1	25 - 29	0.24	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.00	0.00	0.71	0.00	0.24	0.48	1.19	0.48	0.24	0.48	0.00	0.71	0.00	0.48	0.48	0.24	6.43	91.19
15.2 - 17.7	30 - 34	0.24	0.00	0.00	0.24	0.24	0.48	0.00	0.00	0.00	0.00	0.24	0.00	0.71	0.00	0.00	0.48	0.00	0.00	0.48	0.00	0.00	0.24	0.00	0.24	3.57	94.76
17.8 - 20.3	35 - 39	0.00	0.24	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.24	0.24	0.00	0.00	0.24	0.00	0.24	0.24	0.00	0.00	0.00	2.38	97.14
20.4 - 22.9	40 - 44	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.48	0.24	0.48	0.00	0.24	0.00	0.00	0.24	0.00	0.00	0.48	2.86	100.00
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Total		3.57	4.05	1.19	2.62	1.90	0.71	0.48	1.90	1.67	2.14	4.05	4.52	8.33	11.43	10.48	8.57	8.33	5.48	3.57	4.29	2.38	3.81	2.38	2.14	100.00	

TABLE II. 10. OCTOBER (434 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.00	0.46	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.69	0.23	0.23	0.46	0.92	0.69	0.00	0.69	0.00	0.00	0.00	0.00	0.23	0.00	5.07	5.07
4.9 - 7.4	10 - 14	1.84	0.23	1.38	1.15	0.23	0.23	0.46	0.69	0.23	0.46	2.30	2.53	3.23	3.00	1.15	3.23	1.61	1.61	0.69	0.46	0.46	0.69	0.69	1.61	30.18	35.25
7.5 - 10.0	15 - 19	1.84	0.69	0.46	0.00	0.69	0.69	0.23	0.92	0.69	0.92	1.38	0.92	2.07	3.23	1.61	3.23	1.38	0.92	1.15	1.84	0.92	1.15	0.46	1.15	28.57	63.82
10.1 - 12.6	20 - 24	0.69	0.46	0.23	0.46	0.46	0.69	0.46	0.46	0.00	1.61	0.46	1.84	1.84	2.30	1.61	0.92	1.15	0.23	0.69	0.23	0.46	1.15	0.23	0.00	18.66	82.49
12.7 - 15.1	25 - 29	0.46	0.69	0.00	0.00	0.00	0.00	0.46	0.00	0.46	0.46	0.23	1.15	0.46	0.46	0.00	1.38	0.69	0.69	0.46	0.23	0.46	0.69	0.69	0.46	10.60	93.09
15.2 - 17.7	30 - 34	0.00	0.00	0.23	0.00	0.23	0.00	0.46	0.46	0.00	0.23	0.23	0.23	0.23	0.00	0.00	0.23	0.46	0.00	0.23	0.00	0.00	0.00	0.46	0.23	3.92	97.00
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.23	0.00	0.23	0.46	0.00	2.07	99.08
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	99.31
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.69	100.00
Total		4.84	2.53	2.53	1.61	1.61	1.84	2.07	2.76	1.61	3.92	5.30	7.14	8.06	9.68	5.30	9.68	5.53	4.38	3.23	3.23	2.30	4.15	3.23	3.46	100.00	

TABLE II. 11. NOVEMBER (420 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.48	1.19	0.48	0.00	0.00	0.00	0.71	0.71	0.24	0.48	0.95	0.00	1.19	0.95	0.71	0.71	0.24	0.00	0.24	0.24	0.71	0.48	0.00	0.24	10.95	10.95
4.9 - 7.4	10 - 14	1.90	0.71	0.48	1.19	0.95	1.19	0.48	0.71	1.19	2.14	2.62	3.10	1.19	2.38	2.38	2.14	2.14	1.19	0.71	0.00	0.48	0.71	1.67	1.19	32.86	43.81
7.5 - 10.0	15 - 19	1.67	0.95	0.48	0.71	1.43	0.24	0.24	0.48	1.67	0.95	0.24	3.10	2.62	2.38	2.38	0.95	1.19	0.24	0.24	0.95	0.71	0.95	0.95	1.90	27.62	71.43
10.1 - 12.6	20 - 24	0.71	0.48	0.00	0.48	0.48	0.95	0.48	0.00	0.24	1.19	0.71	0.95	1.19	1.90	1.43	1.43	1.43	0.95	0.48	0.24	0.24	0.00	0.95	0.48	17.38	88.81
12.7 - 15.1	25 - 29	0.24	0.24	0.48	0.24	0.48	0.24	0.95	0.24	0.00	0.24	0.00	0.48	0.71	0.48	0.48	0.48	0.48	0.00	0.71	0.00	0.00	0.00	0.24	0.24	7.62	96.43
15.2 - 17.7	30 - 34	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.48	0.00	0.00	0.00	0.24	0.24	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	1.90	98.33
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	98.81
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.71	99.52
≥23.0	≥45	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.48	100.00
Total		5.00	3.81	1.90	2.62	3.81	2.62	2.86	2.62	3.33	5.00	4.76	7.86	7.38	8.57	7.62	5.71	5.48	2.38	2.38	1.43	2.62	2.14	3.81	4.29	100.00	

TABLE II. 12. DECEMBER (434 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.92	0.69	0.00	0.00	0.00	0.23	0.00	0.00	0.69	0.23	1.15	1.15	0.23	0.46	1.15	1.15	0.92	0.46	0.69	0.23	0.00	0.69	0.69	0.69	12.44	12.44
4.9 - 7.4	10 - 14	1.38	0.92	1.61	0.92	0.69	0.92	0.00	0.00	1.61	1.61	3.23	2.07	4.15	2.53	2.76	3.00	2.07	0.69	0.46	0.23	0.46	0.92	0.69	0.46	33.41	45.85
7.5 - 10.0	15 - 19	0.46	0.46	1.38	0.69	0.23	0.46	0.69	0.23	0.69	1.15	1.84	1.61	1.61	1.84	1.15	1.61	1.15	0.92	0.00	0.00	0.00	0.69	0.92	0.46	20.28	66.13
10.1 - 12.6	20 - 24	0.46	0.46	0.69	0.46	0.69	0.23	0.69	0.92	0.69	0.69	1.38	2.53	1.61	2.07	0.46	0.69	0.23	0.00	0.23	0.00	0.69	0.23	0.46	0.69	17.28	83.41
12.7 - 15.1	25 - 29	0.00	0.23	0.23	0.69	0.23	0.23	0.69	0.23	0.69	0.92	0.00	0.46	0.69	1.15	0.46	0.69	0.23	0.00	0.69	0.00	0.00	0.46	0.23	0.23	9.45	92.86
15.2 - 17.7	30 - 34	0.23	0.00	0.00	0.46	0.46	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.23	0.00	0.23	0.23	0.00	0.00	0.00	0.46	0.23	0.23	0.23	0.23	3.69	96.54
17.8 - 20.3	35 - 39	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.46	0.23	0.00	0.23	0.23	0.00	0.00	0.00	0.23	2.30	98.85
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	99.08
≥23.0	≥45	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.92	100.00
Total		3.69	2.76	4.15	3.46	2.30	2.07	2.07	1.38	4.38	5.07	8.06	8.06	8.53	8.06	6.22	7.83	4.84	2.07	2.53	1.15	1.61	3.23	3.23	3.23	100.00	

TABLE II. 13. WINTER (1263 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.87	0.32	0.00	0.08	0.24	0.32	0.16	0.00	0.32	0.16	0.79	0.87	1.03	0.40	0.95	0.95	0.48	0.32	0.32	0.08	0.16	0.40	0.40	0.32	9.90	9.90
4.9 - 7.4	10 - 14	1.58	0.95	1.11	0.55	0.55	0.55	0.32	0.63	0.71	1.35	2.61	3.09	3.64	2.85	3.09	2.53	2.22	1.03	0.40	0.40	0.63	0.63	0.63	0.79	32.86	42.76
7.5 - 10.0	15 - 19	0.55	0.48	1.43	0.71	0.79	0.40	0.55	0.55	0.87	0.79	1.74	1.98	1.82	2.14	1.03	1.90	1.43	0.71	0.32	0.32	0.16	0.55	0.71	0.87	22.80	65.56
10.1 - 12.6	20 - 24	0.55	0.63	0.40	0.40	0.32	0.24	0.55	0.63	0.40	0.48	1.03	1.82	1.27	1.66	1.35	1.35	0.71	0.16	0.24	0.40	0.55	0.24	0.71	0.40	16.47	82.03
12.7 - 15.1	25 - 29	0.08	0.24	0.40	0.40	0.16	0.24	0.48	0.24	0.24	0.48	0.71	0.55	0.63	1.11	0.95	1.11	0.40	0.24	0.24	0.08	0.16	0.48	0.32	0.16	10.06	92.08
15.2 - 17.7	30 - 34	0.16	0.16	0.24	0.32	0.40	0.16	0.16	0.16	0.08	0.08	0.16	0.16	0.16	0.48	0.32	0.48	0.16	0.00	0.08	0.16	0.08	0.16	0.40	0.08	4.75	96.83
17.8 - 20.3	35 - 39	0.08	0.00	0.08	0.16	0.00	0.00	0.00	0.00	0.00	0.16	0.08	0.16	0.24	0.16	0.00	0.48	0.08	0.00	0.08	0.24	0.08	0.08	0.00	0.08	2.22	99.05
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.08	0.00	0.08	0.55	99.60
≥23.0	≥45	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.00	0.00	0.40	100.00
Total		3.88	2.77	3.80	2.61	2.45	1.90	2.22	2.22	2.61	3.56	7.13	8.71	8.95	8.79	7.68	8.79	5.46	2.53	1.74	1.74	1.90	2.61	3.17	2.77	100.00	

TABLE II. 14. SPRING (1288 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.08	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.08	0.31	0.23	0.16	0.16	0.39	0.31	0.08	0.08	0.08	0.00	0.00	0.08	0.00	0.00	0.08	2.25	2.25
4.9 - 7.4	10 - 14	1.32	0.54	0.78	0.39	0.54	0.54	0.16	1.01	0.93	1.16	1.86	1.79	2.56	2.41	3.26	3.34	2.33	2.41	1.48	0.78	0.78	0.70	0.85	0.62	32.53	34.78
7.5 - 10.0	15 - 19	0.70	0.85	0.70	0.23	0.16	0.23	0.47	0.39	0.93	1.55	1.63	1.86	2.17	3.26	2.87	3.49	2.87	2.02	0.85	1.16	0.78	1.32	1.09	1.24	32.84	67.62
10.1 - 12.6	20 - 24	0.39	0.47	0.39	0.08	0.23	0.08	0.31	0.39	0.31	0.78	0.85	1.16	0.93	1.79	2.17	2.17	1.55	1.01	0.54	1.01	0.39	0.54	0.16	0.16	17.86	85.48
12.7 - 15.1	25 - 29	0.23	0.00	0.00	0.31	0.08	0.23	0.00	0.16	0.08	0.62	0.16	0.23	0.31	0.54	0.70	0.78	0.08	0.23	0.54	0.47	0.16	0.00	0.00	0.47	6.37	91.85
15.2 - 17.7	30 - 34	0.31	0.00	0.31	0.16	0.00	0.16	0.08	0.16	0.16	0.08	0.23	0.47	0.16	0.31	0.62	0.31	0.39	0.23	0.00	0.47	0.08	0.16	0.16	0.08	5.05	96.89
17.8 - 20.3	35 - 39	0.00	0.08	0.00	0.00	0.08	0.00	0.16	0.00	0.00	0.00	0.16	0.08	0.08	0.23	0.23	0.39	0.00	0.00	0.16	0.00	0.00	0.08	0.08	0.00	1.79	98.68
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.00	0.08	0.00	0.08	0.23	0.00	0.08	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.08	0.08	0.93	99.61
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.16	0.08	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.39	100.00
Total		3.03	1.94	2.17	1.32	1.16	1.24	1.24	2.10	2.48	4.58	5.12	5.82	6.68	9.08	10.33	10.56	7.30	6.06	3.73	3.88	2.25	2.80	2.41	2.72	100.00	

TABLE II. 15. SUMMER (1288 Observations)

SPEED		HOUR (LST)																								
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.08	0.31	0.00	0.16	0.08	0.00	0.00	0.23	0.08	0.00	0.62	0.78	0.70	0.70	0.54	0.31	0.16	0.00	0.08	0.16	0.00	0.00	0.00	0.16	5.12	5.12
4.9 - 7.4	10 - 14	0.78	0.62	0.39	0.23	0.16	0.16	0.16	0.39	0.62	0.85	1.63	2.48	2.64	4.81	7.07	6.37	5.90	3.96	2.17	1.16	0.70	0.78	0.16	0.54	44.72	49.84
7.5 - 10.0	15 - 19	0.16	0.31	0.23	0.00	0.47	0.08	0.08	0.16	0.62	0.39	0.85	0.93	1.55	2.95	2.48	4.04	3.42	2.87	1.40	0.78	0.54	0.39	0.39	0.39	25.47	75.31
10.1 - 12.6	20 - 24	0.08	0.08	0.16	0.08	0.08	0.08	0.16	0.08	0.16	0.16	0.47	0.47	1.16	0.85	2.02	1.01	2.02	1.48	0.85	0.62	0.47	0.31	0.23	0.08	13.12	88.43
12.7 - 15.1	25 - 29	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.08	0.08	0.16	0.16	0.31	0.16	0.54	0.62	1.01	0.78	0.93	0.23	0.16	0.23	0.08	0.00	0.08	5.67	94.10
15.2 - 17.7	30 - 34	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.16	0.39	0.23	0.39	0.47	0.16	0.16	0.16	0.16	0.00	0.00	0.00	0.00	2.56	96.66
17.8 - 20.3	35 - 39	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.62	0.31	0.23	0.16	0.23	0.00	0.08	0.00	0.08	0.00	0.00	1.94	98.60
20.4 - 22.9	40 - 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.16	0.00	0.31	0.08	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.78	99.38
≥23.0	≥45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.16	0.08	0.08	0.00	0.00	0.00	0.00	0.62	100.00
Total		1.09	1.32	0.78	0.62	0.93	0.31	0.39	1.09	1.63	1.55	3.73	5.12	7.07	10.87	13.74	13.51	12.73	9.86	4.97	3.11	1.94	1.63	0.78	1.24	100.00	

TABLE II. 16. FALL (1274 Observations)

SPEED		HOUR (LST)																									
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.16	0.55	0.24	0.00	0.00	0.00	0.24	0.24	0.08	0.24	0.71	0.39	0.78	0.63	0.71	0.78	0.39	0.31	0.08	0.16	0.31	0.16	0.08	0.08	7.30	7.30
4.9 - 7.4	10 - 14	1.73	0.86	0.71	0.94	0.63	0.47	0.39	0.55	0.71	1.33	2.12	2.35	2.59	3.53	2.67	3.06	2.28	1.65	0.86	0.63	0.63	0.94	0.94	1.10	33.67	40.97
7.5 - 10.0	15 - 19	1.41	0.71	0.55	0.71	0.86	0.31	0.16	0.94	1.02	0.78	0.78	1.65	1.96	2.51	2.20	1.81	1.65	0.71	0.71	1.26	0.78	1.02	0.78	1.18	26.45	67.43
10.1 - 12.6	20 - 24	0.78	0.78	0.16	0.31	0.39	0.55	0.31	0.24	0.16	1.02	0.47	1.26	1.57	2.28	1.41	1.18	1.41	0.78	0.78	0.39	0.24	0.63	0.55	0.24	17.90	85.32
12.7 - 15.1	25 - 29	0.31	0.31	0.16	0.08	0.16	0.16	0.55	0.08	0.16	0.24	0.31	0.55	0.47	0.47	0.55	0.78	0.47	0.39	0.39	0.31	0.16	0.39	0.47	0.31	8.24	93.56
15.2 - 17.7	30 - 34	0.08	0.00	0.08	0.08	0.24	0.16	0.16	0.31	0.00	0.08	0.16	0.16	0.39	0.08	0.08	0.24	0.16	0.00	0.24	0.00	0.00	0.08	0.16	0.24	3.14	96.70
17.8 - 20.3	35 - 39	0.00	0.08	0.00	0.08	0.16	0.08	0.00	0.00	0.08	0.00	0.00	0.16	0.16	0.08	0.08	0.00	0.08	0.16	0.00	0.16	0.08	0.08	0.16	0.00	1.65	98.35
20.4 - 22.9	40 - 44	0.00	0.08	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.31	0.08	0.16	0.00	0.08	0.00	0.00	0.16	0.00	0.00	0.16	1.26	99.61
≥23.0	≥45	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.00	0.00	0.39	100.00
Total		4.47	3.45	1.88	2.28	2.43	1.73	1.81	2.43	2.20	3.69	4.71	6.51	7.93	9.89	7.77	8.01	6.44	4.08	3.06	2.98	2.43	3.38	3.14	3.30	100.00	

TABLE II. 17. ANNUAL (5113 Observations)

SPEED		HOUR (LST)																									
($m\ sec^{-1}$)	(knots)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Cum. Total
≤4.8	≤9	0.29	0.29	0.06	0.10	0.08	0.08	0.10	0.12	0.14	0.18	0.59	0.55	0.66	0.53	0.63	0.53	0.27	0.18	0.12	0.10	0.14	0.14	0.12	0.16	6.12	6.12
4.9 - 7.4	10 - 14	1.35	0.74	0.74	0.53	0.47	0.43	0.25	0.65	0.74	1.17	2.05	2.43	2.86	3.40	4.03	3.83	3.19	2.27	1.23	0.74	0.68	0.76	0.65	0.76	35.97	42.09
7.5 - 10.0	15 - 19	0.70	0.59	0.72	0.41	0.57	0.25	0.31	0.51	0.86	0.88	1.25	1.60	1.88	2.72	2.15	2.82	2.35	1.58	0.82	0.88	0.57	0.82	0.74	0.92	26.91	69.00
10.1 - 12.6	20 - 24	0.45	0.49	0.27	0.22	0.25	0.23	0.33	0.33	0.25	0.61	0.70	1.17	1.23	1.64	1.74	1.43	1.43	0.86	0.61	0.61	0.41	0.43	0.41	0.22	16.33	85.33
12.7 - 15.1	25 - 29	0.16	0.14	0.14	0.20	0.12	0.16	0.25	0.14	0.14	0.37	0.33	0.41	0.39	0.66	0.70	0.92	0.43	0.45	0.35	0.25	0.18	0.23	0.20	0.25	7.57	92.90
15.2 - 17.7	30 - 34	0.14	0.04	0.16	0.18	0.16	0.12	0.10	0.20	0.06	0.06	0.14	0.23	0.27	0.27	0.35	0.37	0.22	0.10	0.12	0.20	0.04	0.10	0.18	0.10	3.87	96.77
17.8 - 20.3	35 - 39	0.02	0.04	0.02	0.06	0.08	0.02	0.04	0.00	0.02	0.04	0.06	0.10	0.16	0.27	0.16	0.27	0.08	0.10	0.06	0.12	0.04	0.08	0.06	0.02	1.90	98.67
20.4 - 22.9	40 - 44	0.00	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.04	0.04	0.02	0.14	0.08	0.12	0.06	0.00	0.10	0.02	0.02	0.04	0.02	0.02	0.08	0.88	99.55
≥23.0	≥45	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.06	0.08	0.02	0.00	0.04	0.02	0.06	0.02	0.04	0.02	0.00	0.00	0.45	100.00
Total		3.11	2.37	2.15	1.70	1.74	1.29	1.41	1.96	2.23	3.34	5.16	6.53	7.65	9.66	9.90	10.23	8.00	5.65	3.38	2.93	2.13	2.60	2.37	2.50	100.00	

PERCENTAGE FREQUENCY DISTRIBUTIONS
DAILY PEAK SURFACE WIND
CAPE KENNEDY, FLORIDA
FEBRUARY 1950 - JANUARY 1964

TABLE III: HOUR OF OCCURRENCE VERSUS DIRECTION

III. 1.	January
III. 2.	February
III. 3.	March
III. 4.	April
III. 5.	May
III. 6.	June
III. 7.	July
III. 8.	August
III. 9.	September
III. 10.	October
III. 11.	November
III. 12.	December
III. 13.	Winter
III. 14.	Spring
III. 15.	Summer
III. 16.	Fall
III. 17.	Annual

DESCRIPTION: Table III presents bivariate percentage frequency distributions of hour of occurrence -- in local standard time (LST) -- and direction associated with daily peak wind speed. The value found by intersecting an hour row and a direction column represents the percentage of time that, during the sixty-minute period beginning on the indicated hour, a peak wind from the corresponding direction may be expected to occur.

Total column values represent the percentage frequency distribution of the hour of occurrence of daily peak wind speed. Each value is the percentage of time that a peak wind may be expected during the indicated hour.

Total row values represent the percentage frequency distribution of wind direction associated with the daily peak wind speeds. Each value indicates the percentage of time that a peak wind may be expected from the corresponding 16-point compass direction.

Each percentage frequency in the total row and column was obtained from a corresponding cumulative frequency and, because of rounding, may not be in exact agreement with the value obtained by adding the individual column or row percentages.

TABLE III. 1. JANUARY (434 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.23	0.00	0.46	0.23	0.23	0.00	0.46	0.46	0.23	0.00	0.23	0.23	0.23	0.46	0.69	0.00	4.15
1	0.46	0.00	0.00	0.00	0.69	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.46	0.23	2.53
2	1.15	0.23	0.23	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.46	0.00	0.69	0.69	0.69	0.46	5.07
3	0.46	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.46	0.00	0.00	0.00	0.00	0.69	0.46	2.53
4	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.46	0.46	1.15	2.76
5	0.69	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	1.38
6	0.46	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.46	0.00	0.23	0.00	0.92	0.46	3.23
7	0.69	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.46	2.53
8	0.46	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.46	0.23	1.61
9	0.46	0.00	0.00	0.23	0.46	0.00	0.00	0.23	0.23	0.23	0.00	0.23	0.23	0.00	0.23	0.69	3.23
10	1.38	0.23	0.00	0.00	0.00	0.23	0.00	0.23	0.23	0.23	1.38	0.23	0.23	0.46	0.69	0.46	5.99
11	1.38	0.23	0.69	0.00	0.69	0.46	0.23	0.23	0.69	0.46	0.69	1.15	0.69	0.46	1.15	1.15	10.37
12	0.69	0.92	1.38	0.23	0.46	0.46	0.00	0.46	1.38	0.92	1.15	0.00	0.23	0.46	0.92	1.38	11.06
13	1.38	0.69	0.23	0.23	0.23	0.69	0.46	0.69	0.46	1.15	0.46	0.69	0.00	0.69	0.00	0.46	8.53
14	1.38	0.69	0.00	0.00	0.46	0.23	0.23	0.23	0.69	0.23	0.69	0.23	0.23	0.23	0.23	0.69	6.45
15	1.15	0.23	0.46	0.46	0.46	0.23	1.61	0.92	0.00	0.00	0.46	0.46	0.23	0.23	0.69	0.46	8.06
16	1.15	0.46	0.46	0.00	0.46	0.00	0.92	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.23	4.38
17	0.69	0.46	0.23	0.00	0.46	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.23	2.53
18	0.00	0.00	0.00	0.00	0.00	0.23	0.69	0.23	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.00	1.61
19	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.69
20	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.46	0.00	0.00	0.23	0.23	0.00	0.00	0.00	2.07
21	0.23	0.23	0.00	0.46	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.23	0.00	0.69	0.23	2.53
22	0.46	0.00	0.00	0.00	0.46	0.23	0.46	0.00	0.46	0.23	0.00	0.46	0.23	0.46	0.00	0.23	3.69
23	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.46	0.46	0.69	0.00	0.23	0.23	0.46	0.00	3.00
Total	15.67	4.61	4.84	1.84	5.53	3.46	5.99	5.53	6.22	4.38	6.68	3.92	4.38	5.76	11.29	9.91	100.00

TABLE III. 2. FEBRUARY (395 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.25	0.00	0.25	0.00	0.76	0.25	0.00	0.00	0.51	0.25	0.51	0.00	0.25	0.00	0.25	0.51	3.80
1	0.76	0.00	0.00	0.00	0.00	0.00	0.51	0.25	0.25	0.00	0.00	0.00	0.00	0.25	1.01	0.00	3.04
2	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.25	0.51	0.00	0.25	0.25	0.00	2.03
3	0.00	0.00	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.51	0.25	0.25	1.77
4	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.51	0.76	0.25	2.28
5	0.00	0.00	0.25	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25	1.01	0.25	2.28
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.25	0.51	1.27
7	0.00	0.00	0.51	0.51	0.00	0.25	0.51	0.25	0.00	0.00	0.00	0.00	0.25	0.00	0.51	0.00	2.78
8	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.51	0.51	1.77
9	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.51	0.51	0.51	2.28
10	1.27	0.25	0.00	0.25	0.25	0.51	0.76	0.00	0.76	0.25	0.76	0.25	0.76	0.51	0.76	0.00	7.34
11	2.03	0.76	0.00	0.25	0.00	0.51	0.25	0.00	0.51	0.25	0.25	0.00	0.76	0.51	0.76	0.76	7.59
12	0.76	0.51	0.76	0.25	0.25	0.25	0.76	0.25	1.01	0.00	0.76	0.76	0.25	0.00	0.00	0.51	7.09
13	1.77	0.51	0.00	0.00	0.25	1.01	1.52	0.51	0.00	1.01	0.51	0.25	0.25	0.76	0.51	1.01	9.87
14	1.27	0.76	0.76	0.25	1.27	0.25	2.03	1.77	0.00	0.00	1.01	0.51	0.51	0.25	0.00	0.00	10.63
15	1.01	0.76	0.00	0.51	0.51	0.25	2.53	1.01	0.00	0.51	0.51	1.01	0.51	1.52	0.00	0.00	10.63
16	1.52	0.76	0.51	0.00	0.51	0.25	1.01	1.01	0.00	0.25	0.25	0.00	0.76	0.25	0.00	0.25	7.34
17	0.76	0.25	0.25	0.00	0.00	0.25	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.04
18	0.25	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	1.01
19	0.00	0.00	0.00	0.25	0.25	0.25	0.76	0.51	0.00	0.25	0.00	0.25	0.25	0.25	0.25	0.25	3.54
20	0.00	0.51	0.00	0.00	0.25	0.51	0.25	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.03
21	0.00	0.00	0.00	0.00	0.51	0.00	0.25	0.25	0.25	0.00	0.00	0.00	0.25	0.25	0.00	0.25	2.03
22	0.25	0.00	0.00	0.00	0.25	0.51	0.25	0.00	0.25	0.25	0.00	0.00	0.51	0.00	0.25	0.00	2.53
23	0.25	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.51	0.51	0.25	0.00	2.03
Total	12.15	5.06	4.30	2.53	5.82	5.82	13.42	6.58	4.05	3.04	5.06	3.80	6.84	7.34	8.10	6.08	100.00

TABLE III. 3. MARCH (434 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.46	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.46	0.46	0.46	0.00	0.00	0.69	3.00
1	0.00	0.23	0.23	0.00	0.23	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.23	0.46	0.23	0.00	2.07
2	0.00	0.23	0.69	0.00	0.23	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.46	0.23	0.69	0.23	3.23
3	0.23	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.46	0.23	0.00	0.00	0.00	0.46	0.00	0.23	2.07
4	0.46	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.46	0.00	1.38
5	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.23	0.00	0.00	0.69	0.23	2.30
6	0.46	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.23	1.61
7	0.46	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.46	0.00	0.23	0.23	1.84
8	0.23	0.00	0.00	0.23	0.23	0.46	0.00	0.00	0.23	0.00	0.23	0.00	0.23	0.00	0.23	0.23	2.30
9	0.69	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.23	0.69	0.23	0.00	0.00	0.23	0.46	0.92	3.92
10	0.69	0.69	0.23	0.00	0.46	0.23	0.23	0.23	0.23	0.23	0.69	0.23	0.23	0.69	0.46	0.46	5.99
11	1.84	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.46	0.00	0.00	0.23	0.46	0.69	0.00	0.00	4.15
12	1.38	0.46	0.69	0.23	0.23	0.23	0.46	0.00	0.23	0.23	0.23	0.92	0.46	0.00	0.00	0.00	5.76
13	1.61	0.69	0.46	0.23	0.23	0.23	0.92	1.61	0.00	0.46	0.23	0.46	1.15	0.46	0.00	0.46	9.22
14	0.92	0.92	0.00	0.46	0.46	0.92	1.61	1.38	0.23	0.46	0.69	0.46	1.38	0.69	0.23	0.92	11.75
15	0.69	0.23	0.46	0.23	0.69	0.92	3.00	1.15	0.00	0.00	0.23	0.46	0.92	0.46	0.00	0.00	9.45
16	0.69	0.46	0.46	0.00	0.23	0.23	1.61	1.38	0.46	0.00	0.00	0.00	0.46	0.23	0.23	0.23	6.68
17	0.23	0.23	0.23	0.00	0.92	0.69	1.84	0.92	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	5.30
18	0.23	0.00	0.00	0.00	0.00	0.23	0.92	0.92	0.46	0.00	0.00	0.23	0.69	0.00	0.00	0.23	3.92
19	0.46	0.00	0.00	0.00	0.23	0.23	0.92	0.92	0.00	0.00	0.00	0.23	0.23	0.00	0.23	0.00	3.46
20	0.23	0.23	0.00	0.00	0.00	0.00	0.23	0.46	0.00	0.00	0.00	0.46	0.46	0.00	0.00	0.00	2.07
21	0.23	0.23	0.00	0.00	0.23	0.00	0.23	0.69	0.23	0.00	0.00	0.23	0.46	0.00	0.00	0.00	2.53
22	0.00	0.00	0.23	0.23	0.46	0.00	0.23	0.69	0.92	0.00	0.00	0.00	0.00	0.23	0.00	0.00	3.00
23	0.23	0.23	0.00	0.00	0.23	0.00	0.23	0.46	0.00	0.23	0.46	0.00	0.23	0.00	0.23	0.46	3.00
Total	12.67	5.07	4.15	2.07	5.53	5.07	13.13	11.06	4.61	3.69	4.15	4.61	8.99	5.07	4.38	5.76	100.00

TABLE III. 4. APRIL (420 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.24	0.00	0.00	0.00	0.48	0.24	0.48	0.00	0.24	0.24	0.48	0.00	0.24	0.24	0.00	0.00	2.86
1	0.48	0.24	0.24	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.24	1.90
2	0.24	0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.24	0.24	0.24	0.00	0.24	0.00	0.24	0.00	1.90
3	0.48	0.00	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	1.19
4	0.00	0.00	0.00	0.00	0.24	0.48	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.24	0.48	1.67
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.48
6	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.95	0.00	1.67
7	0.48	0.24	0.00	0.71	0.00	0.24	0.24	0.48	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.48	3.10
8	0.71	0.24	0.00	0.00	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.48	0.48	3.33
9	0.24	0.00	0.24	0.00	0.95	0.71	0.48	0.24	0.24	0.00	0.00	0.00	0.24	0.00	0.24	1.90	5.48
10	0.71	0.24	0.00	0.48	0.48	0.71	0.48	0.48	0.00	0.48	0.00	0.24	0.00	0.24	0.71	0.24	5.48
11	0.95	0.48	0.24	0.00	0.48	0.95	0.71	0.48	0.24	0.24	0.24	0.24	0.24	0.71	0.48	0.24	6.90
12	0.24	0.24	0.48	0.48	2.14	1.19	0.24	0.00	0.48	0.00	0.48	0.24	0.48	0.24	0.24	0.24	7.38
13	0.71	0.71	1.43	0.24	0.95	0.48	1.90	0.48	0.48	0.24	0.71	0.24	0.24	0.00	0.00	0.24	9.05
14	0.95	0.24	0.71	0.48	1.43	0.48	0.95	0.48	0.48	0.48	0.48	0.24	0.71	0.48	0.00	0.00	8.57
15	0.48	1.19	1.19	0.48	1.19	1.43	2.14	0.71	0.71	0.24	0.00	0.24	0.71	0.24	0.00	0.24	11.19
16	0.24	0.00	0.24	0.24	0.24	0.71	1.19	0.71	0.24	0.00	0.48	0.00	0.48	0.00	0.24	0.48	5.48
17	0.24	0.24	0.00	0.71	0.48	0.48	0.95	0.71	0.24	0.00	0.48	0.24	0.95	0.24	0.00	0.00	5.95
18	0.00	0.24	0.24	0.00	0.00	0.71	0.71	0.95	0.00	0.00	0.24	0.00	0.48	0.00	0.00	0.00	3.57
19	0.24	0.00	0.00	0.00	0.00	0.24	1.43	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.62
20	0.48	0.00	0.00	0.24	0.24	0.24	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67
21	0.00	0.00	0.24	0.48	0.24	0.95	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.14
22	0.00	0.24	0.00	0.00	0.24	0.24	0.95	0.00	0.48	0.00	0.00	0.24	0.24	0.48	0.48	0.00	3.57
23	0.00	0.00	0.24	0.48	0.24	0.24	1.19	0.24	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	2.86
Total	8.10	4.52	5.48	5.00	10.95	11.90	14.76	7.14	4.29	2.86	4.05	1.90	5.48	3.81	4.52	5.24	100.00

TABLE III. 5. MAY (434 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.23	0.46	0.46	0.46	0.23	0.46	0.00	0.00	0.23	0.23	0.00	0.00	0.23	0.00	0.00	0.23	3.23
1	0.23	0.00	0.00	0.00	0.46	0.00	0.23	0.23	0.00	0.46	0.23	0.00	0.00	0.00	0.00	0.00	1.84
2	0.00	0.23	0.00	0.23	0.23	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.23	0.00	0.00	0.00	1.38
3	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.69
4	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.46
5	0.00	0.00	0.23	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.92
6	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
7	0.00	0.46	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	1.38
8	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.23	0.69	0.23	1.84
9	0.00	0.46	0.00	0.46	0.23	0.23	0.46	0.69	0.23	0.46	0.23	0.00	0.00	0.00	0.69	0.23	4.38
10	0.23	0.46	0.69	0.69	0.69	0.46	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	3.92
11	0.92	0.46	0.92	0.46	0.69	0.69	1.15	0.23	0.23	0.23	0.00	0.00	0.23	0.00	0.23	0.00	6.45
12	0.46	0.69	0.46	0.46	0.23	1.84	0.69	0.00	0.23	0.23	0.00	0.23	0.46	0.46	0.23	0.23	6.91
13	0.69	0.69	0.46	0.92	1.84	1.38	1.61	0.46	0.00	0.00	0.46	0.00	0.23	0.00	0.00	0.23	8.99
14	0.92	1.15	0.92	0.92	1.84	2.07	1.61	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.23	10.60
15	0.92	0.46	0.69	0.69	1.61	2.30	2.30	0.46	0.23	0.00	0.00	0.00	0.00	0.46	0.23	0.69	11.06
16	0.00	0.23	1.38	0.00	1.61	1.38	3.23	0.46	0.23	0.23	0.00	0.46	0.00	0.23	0.23	0.00	9.68
17	0.46	0.00	0.46	0.69	0.92	0.46	2.07	1.38	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	6.91
18	0.23	0.00	0.23	0.23	0.69	1.15	0.23	0.46	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	3.69
19	0.23	0.23	0.00	0.46	0.69	0.46	0.46	1.38	0.46	0.23	0.00	0.69	0.00	0.00	0.23	0.00	5.53
20	0.00	0.00	0.00	0.00	0.46	0.00	0.46	1.15	0.00	0.23	0.46	0.00	0.00	0.00	0.23	0.00	3.00
21	0.23	0.00	0.00	0.00	0.69	0.69	0.46	0.46	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.23	3.69
22	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
23	0.00	0.00	0.00	0.23	0.23	0.46	0.46	0.23	0.23	0.00	0.00	0.23	0.23	0.00	0.00	0.00	2.30
Total	5.76	6.22	7.14	7.60	14.29	14.06	16.36	8.29	3.46	2.76	1.84	2.53	2.07	1.61	3.69	2.30	100.00

TABLE III. 6. JUNE (420 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.00	0.00	0.00	0.00	0.24	0.24	0.48	0.24	0.00	0.24	0.00	0.00	0.24	0.00	0.00	0.00	1.67
1	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.95
2	0.00	0.00	0.24	0.24	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.24	1.90
3	0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48
4	0.00	0.48	0.00	0.00	0.24	0.00	0.48	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	1.43
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.24	0.00	0.48
6	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.24	0.00	0.00	0.00	0.00	0.48	0.00	1.19
8	0.00	0.24	0.00	0.00	0.00	0.24	0.48	0.00	0.24	0.24	0.00	0.00	0.00	0.24	0.00	0.00	1.67
9	0.00	0.00	0.24	0.24	0.00	0.00	0.00	0.24	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.00	1.19
10	0.48	0.48	0.48	0.24	0.24	0.71	0.24	0.71	0.00	0.00	0.00	0.00	0.24	0.00	0.24	0.48	4.52
11	0.24	0.48	0.24	0.71	0.24	0.24	0.00	0.48	0.24	0.00	0.24	0.48	0.24	0.00	0.00	0.00	3.81
12	0.48	0.48	0.71	0.48	1.90	0.71	0.48	0.24	0.24	0.00	0.24	0.48	0.48	0.00	0.48	0.00	7.38
13	0.00	0.48	1.19	0.71	1.43	0.95	2.14	0.24	0.24	0.00	0.48	0.00	0.71	0.24	0.00	0.71	9.52
14	0.48	0.00	0.71	1.19	1.90	1.43	3.33	0.71	0.71	0.71	0.00	0.00	0.71	0.71	0.48	0.00	13.10
15	0.24	0.48	0.71	0.48	1.67	1.67	3.33	1.43	0.71	0.00	0.48	0.71	0.00	0.00	0.00	0.00	11.90
16	0.48	0.24	1.19	0.48	1.67	3.10	2.14	2.62	0.48	0.24	0.24	0.24	0.00	0.95	0.00	0.48	14.52
17	0.00	0.00	0.48	0.00	0.00	1.67	3.33	1.67	0.71	0.24	0.71	0.24	0.71	0.00	0.00	0.24	10.00
18	0.24	0.00	0.24	0.00	0.24	0.71	1.19	0.71	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.05
19	0.00	0.00	0.00	0.24	0.24	0.24	0.24	0.24	0.48	0.71	0.24	0.00	0.71	0.00	0.00	0.00	3.33
20	0.24	0.00	0.24	0.00	0.24	0.24	0.48	0.24	0.00	0.24	0.00	0.24	0.24	0.00	0.00	0.00	2.38
21	0.00	0.00	0.24	0.00	0.00	0.00	0.95	0.48	0.24	0.00	0.00	0.00	0.00	0.24	0.00	0.00	2.14
22	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.95
23	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.24	0.24	0.24	0.24	0.00	0.00	0.00	0.00	0.00	1.19
Total	2.86	3.33	6.90	5.00	10.71	13.81	19.76	11.43	5.24	3.57	3.57	2.62	4.76	2.38	1.90	2.14	100.00

TABLE III. 7. JULY (434 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.23	1.15
1	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.69	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	1.38
2	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.46
3	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.69
4	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.46
5	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.46
6	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
7	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
8	0.46	0.00	0.00	0.00	0.00	0.23	0.46	0.00	0.23	0.00	0.00	0.23	0.23	0.00	0.00	0.00	1.84
9	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.23	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	1.38
10	0.00	0.23	0.23	0.00	0.00	0.46	0.69	0.23	0.46	0.00	0.23	0.00	0.00	0.23	0.00	0.00	2.76
11	0.00	0.69	0.23	0.23	1.15	0.69	0.23	0.46	0.23	0.46	1.15	0.00	0.23	0.00	0.23	0.00	5.99
12	0.23	0.00	0.00	0.23	0.92	0.23	0.92	0.92	0.23	0.23	0.00	0.23	0.00	0.23	0.00	0.00	4.38
13	0.23	0.00	0.23	1.15	1.38	2.30	1.61	1.15	0.00	0.46	0.46	0.46	0.46	0.46	0.00	0.00	10.37
14	0.46	0.23	0.92	1.38	3.69	2.76	3.00	0.92	0.00	0.00	0.46	0.23	0.69	0.69	0.46	0.23	16.13
15	0.69	0.00	0.46	0.00	2.07	3.23	4.38	1.38	0.69	0.23	0.69	0.69	0.23	0.46	0.00	0.23	15.44
16	0.00	0.46	0.00	0.00	0.69	2.76	3.23	0.69	0.92	0.69	0.69	0.00	0.46	0.00	0.69	0.23	11.52
17	0.00	0.00	0.23	0.00	0.23	2.07	3.46	1.15	0.46	0.46	0.69	0.92	0.23	0.69	0.92	0.23	11.75
18	0.23	0.00	0.00	0.00	0.46	0.46	1.84	0.23	0.69	0.00	0.46	0.69	0.23	0.00	0.23	0.00	5.53
19	0.00	0.00	0.00	0.23	0.23	0.23	0.23	0.69	0.46	0.46	0.00	0.00	0.00	0.23	0.00	0.23	3.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.69
21	0.00	0.00	0.23	0.23	0.00	0.00	0.23	0.00	0.00	0.23	0.46	0.00	0.00	0.00	0.00	0.00	1.38
22	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
23	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.46	0.23	0.00	0.00	0.00	0.00	0.00	0.00	1.38
Total	2.30	2.07	2.53	3.69	11.98	17.28	21.43	8.99	5.30	3.69	5.99	4.38	3.00	3.23	2.76	1.38	100.00

TABLE III. 8. AUGUST (434 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.46
1	0.00	0.00	0.00	0.23	0.46	0.00	0.00	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	1.61
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
4	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.92
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.46
7	0.00	0.00	0.00	0.00	0.23	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.46	0.00	1.38
8	0.00	0.00	0.00	0.23	0.23	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.23	0.00	0.00	1.38
9	0.00	0.00	0.23	0.23	0.46	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.23	0.23	0.23	2.07
10	0.23	0.23	0.69	0.00	0.69	0.46	0.46	0.69	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	3.92
11	0.00	0.46	1.15	0.69	1.38	0.23	0.46	0.23	0.69	0.00	0.00	0.00	0.23	0.00	0.00	0.00	5.53
12	0.00	0.69	1.15	0.69	0.69	0.69	1.84	0.23	1.38	0.00	0.23	0.69	0.23	0.69	0.23	0.00	9.45
13	0.46	1.15	1.84	0.92	2.07	1.61	1.61	0.46	0.00	0.23	0.69	0.00	1.38	0.23	0.00	0.00	12.67
14	0.00	0.23	1.38	1.61	2.53	2.30	1.38	0.00	0.69	0.00	0.46	0.46	0.46	0.00	0.23	0.23	11.98
15	0.69	0.46	0.92	0.46	3.46	2.07	2.30	0.46	0.00	0.46	0.23	0.00	0.23	0.46	0.46	0.46	13.13
16	0.23	0.23	0.46	0.23	2.53	1.15	2.30	1.38	0.23	0.23	1.15	0.46	0.46	0.69	0.46	0.00	12.21
17	0.46	0.00	0.46	0.46	0.92	0.92	0.92	1.61	1.15	0.00	0.00	0.00	0.00	0.23	0.23	0.46	7.83
18	0.46	0.00	0.23	0.23	0.46	0.23	0.69	0.46	0.92	0.00	0.92	0.23	0.23	0.00	0.00	0.23	5.30
19	0.00	0.00	0.46	0.23	0.00	0.23	0.00	0.69	0.46	0.23	0.23	0.00	0.23	0.00	0.00	0.23	3.00
20	0.46	0.00	0.00	0.23	0.23	0.46	0.46	0.00	0.23	0.23	0.23	0.23	0.00	0.00	0.00	0.00	2.76
21	0.00	0.00	0.23	0.23	0.23	0.00	0.00	0.23	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	1.38
22	0.00	0.00	0.00	0.00	0.23	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.46	0.23	0.00	1.15
Total	3.00	3.69	9.45	6.68	17.28	11.29	12.90	7.14	6.91	2.07	4.38	2.53	4.15	3.92	2.76	1.84	100.00

TABLE III. 9. SEPTEMBER (420 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.24	0.00	0.00	0.95	0.48	0.48	0.71	0.00	0.24	0.00	0.00	0.24	0.24	0.00	0.00	0.00	3.57
1	0.00	0.00	0.48	0.71	0.95	0.95	0.48	0.00	0.24	0.00	0.00	0.00	0.00	0.24	0.00	0.00	4.05
2	0.00	0.00	0.00	0.24	0.48	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.24	1.19
3	0.00	0.24	0.48	0.00	0.24	0.24	0.24	0.24	0.48	0.24	0.24	0.00	0.00	0.00	0.00	0.00	2.62
4	0.24	0.00	0.48	0.48	0.00	0.48	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	1.90
5	0.00	0.00	0.48	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71
6	0.00	0.00	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48
7	0.00	0.00	0.24	0.00	0.48	0.71	0.00	0.00	0.24	0.00	0.00	0.00	0.24	0.00	0.00	0.00	1.90
8	0.00	0.00	0.24	0.71	0.48	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67
9	0.24	0.24	0.00	0.24	0.48	0.48	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.14
10	0.24	0.00	0.24	0.48	0.95	0.24	0.71	0.24	0.48	0.00	0.00	0.00	0.24	0.00	0.24	0.00	4.05
11	0.00	0.24	1.19	0.48	0.71	0.48	0.48	0.24	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.24	4.52
12	0.71	0.95	1.19	0.95	0.71	1.19	0.95	0.24	0.00	0.00	0.24	0.48	0.24	0.24	0.00	0.24	8.33
13	1.67	0.48	1.43	0.95	2.14	1.19	1.43	0.24	0.24	0.48	0.24	0.00	0.71	0.00	0.00	0.24	11.43
14	0.71	0.48	1.43	0.24	1.90	1.19	1.19	0.48	0.95	0.00	0.24	0.24	0.48	0.24	0.24	0.48	10.48
15	1.19	0.48	0.71	0.24	2.14	1.19	0.00	0.48	0.48	0.24	0.48	0.24	0.24	0.24	0.00	0.24	8.57
16	0.24	0.48	0.48	0.71	1.90	0.95	1.19	0.95	0.71	0.00	0.24	0.00	0.24	0.00	0.24	0.00	8.33
17	0.71	0.00	0.24	0.24	0.95	0.71	0.48	0.95	0.24	0.00	0.24	0.00	0.24	0.24	0.24	0.00	5.48
18	0.71	0.00	0.48	0.24	0.24	0.24	0.71	0.48	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.00	3.57
19	0.24	0.71	0.48	0.00	0.71	0.48	0.71	0.48	0.00	0.24	0.00	0.00	0.24	0.00	0.00	0.00	4.29
20	0.00	0.24	0.00	0.24	0.95	0.00	0.00	0.48	0.00	0.24	0.00	0.00	0.24	0.00	0.00	0.00	2.38
21	0.00	0.00	0.48	0.00	0.48	0.48	0.71	0.24	0.00	0.00	0.48	0.24	0.00	0.00	0.24	0.48	3.81
22	0.00	0.24	0.00	0.24	0.71	0.24	0.71	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.38
23	0.00	0.00	0.48	0.24	0.24	0.48	0.24	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	2.14
Total	7.14	4.76	11.19	8.81	18.57	12.62	11.43	6.19	4.52	2.14	2.86	1.67	3.57	1.19	1.19	2.14	100.00

TABLE III. 10. OCTOBER (434 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.00	0.23	0.46	0.46	0.46	1.38	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.46	4.84
1	0.00	0.23	0.00	0.23	1.38	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	2.53
2	0.23	0.23	0.23	0.23	0.23	0.00	0.00	0.23	0.00	0.00	0.23	0.23	0.00	0.00	0.23	0.46	2.53
3	0.46	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.23	1.61
4	0.46	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.46	1.61
5	0.00	0.23	0.23	0.46	0.46	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	1.84
6	0.00	0.00	0.92	0.46	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.07
7	0.69	0.23	0.00	0.00	0.46	0.23	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.23	2.76
8	0.23	0.23	0.46	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	1.61
9	0.23	0.46	0.92	0.46	0.23	0.23	0.23	0.00	0.00	0.00	0.23	0.00	0.00	0.23	0.46	0.23	3.92
10	0.23	0.92	0.69	0.00	1.15	0.23	0.00	0.00	0.23	0.69	0.00	0.00	0.46	0.00	0.23	0.46	5.30
11	1.15	0.92	1.15	0.46	0.23	0.23	0.00	0.23	0.00	0.23	0.00	0.23	0.69	0.46	0.69	0.46	7.14
12	1.61	1.15	1.15	0.69	0.69	0.00	0.23	0.00	0.23	0.00	0.46	0.46	0.00	0.46	0.46	0.46	8.06
13	2.30	0.69	0.92	0.69	0.92	0.46	0.00	0.46	0.69	0.00	0.23	0.23	0.46	0.69	0.46	0.46	9.68
14	1.15	0.69	0.92	0.23	0.92	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.46	0.23	0.00	0.00	5.30
15	1.84	1.61	0.92	0.92	1.15	0.46	0.23	0.23	0.00	0.23	0.46	0.23	0.23	0.23	0.23	0.69	9.68
16	1.15	0.46	0.92	0.46	0.92	0.46	0.46	0.23	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	5.53
17	0.46	0.69	0.46	0.00	0.46	0.46	0.46	0.46	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.46	4.38
18	0.23	0.23	0.46	0.46	0.23	0.23	0.23	0.46	0.00	0.23	0.23	0.00	0.00	0.23	0.00	0.00	3.23
19	0.00	0.23	0.23	0.69	0.46	0.23	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.46	3.23
20	0.46	0.23	0.23	0.23	0.23	0.00	0.00	0.46	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.00	2.30
21	0.23	0.46	0.69	0.92	0.69	0.46	0.46	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	4.15
22	0.00	0.00	0.92	0.23	0.46	0.23	0.00	0.92	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	3.23
23	0.23	0.00	0.46	0.23	1.15	0.69	0.00	0.00	0.23	0.46	0.00	0.00	0.00	0.00	0.00	0.00	3.46
Total	13.36	10.14	13.36	9.22	13.36	7.14	3.69	4.61	1.38	1.84	2.76	1.84	3.69	3.00	5.07	5.53	100.00

TABLE III. 11. NOVEMBER (420 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.48	0.71	0.48	0.71	0.71	0.24	0.48	0.24	0.24	0.00	0.00	0.00	0.00	0.24	0.24	0.24	5.00
1	0.00	0.24	0.00	0.95	0.24	0.48	0.24	0.00	0.24	0.00	0.24	0.24	0.24	0.00	0.48	0.24	3.81
2	0.00	0.00	0.24	0.00	0.00	0.24	0.24	0.00	0.00	0.00	0.24	0.24	0.48	0.00	0.24	0.00	1.90
3	0.95	0.00	0.24	0.00	0.00	0.24	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.48	2.62
4	0.00	0.48	0.00	0.00	0.24	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.24	0.48	0.71	1.19	3.81
5	0.00	0.48	0.24	0.24	0.24	0.24	0.24	0.24	0.00	0.00	0.00	0.00	0.24	0.00	0.24	0.24	2.62
6	0.24	0.00	0.48	0.00	0.00	0.00	0.24	0.24	0.24	0.00	0.00	0.24	0.48	0.00	0.48	0.24	2.86
7	0.00	0.24	0.00	0.00	0.48	0.24	0.24	0.00	0.00	0.00	0.00	0.24	0.00	0.24	0.48	0.48	2.62
8	0.48	0.24	0.48	0.24	0.48	0.00	0.24	0.24	0.00	0.00	0.48	0.00	0.24	0.00	0.00	0.24	3.33
9	0.24	0.24	0.48	0.00	0.71	0.95	0.24	0.24	0.00	0.00	0.24	0.00	0.00	0.00	1.19	0.48	5.00
10	0.24	0.71	0.00	0.48	0.95	0.24	0.24	0.24	0.24	0.00	0.00	0.00	0.24	0.48	0.48	0.24	4.76
11	0.48	0.24	0.95	0.48	0.71	0.00	0.24	0.00	0.24	0.71	0.24	0.00	0.48	0.48	1.43	1.19	7.86
12	1.43	0.24	0.95	0.48	0.24	0.24	0.24	0.00	0.48	0.48	0.24	0.71	0.71	0.24	0.24	0.48	7.38
13	1.90	0.48	0.71	0.48	0.71	0.71	0.71	0.24	0.00	0.24	0.24	0.24	0.00	0.00	0.95	0.95	8.57
14	2.14	0.48	0.00	0.00	0.48	0.48	0.71	0.71	0.24	0.00	0.00	0.24	0.48	0.24	0.24	1.19	7.62
15	0.71	0.48	0.48	0.95	0.00	0.71	0.00	0.24	0.24	0.00	0.00	0.00	0.48	0.48	0.48	0.48	5.71
16	1.67	0.00	0.95	0.24	0.24	0.48	0.48	0.24	0.00	0.00	0.00	0.00	0.48	0.00	0.48	0.24	5.48
17	0.24	0.00	0.00	0.48	0.48	0.00	0.00	0.24	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.48	2.38
18	0.48	0.00	0.00	0.00	0.48	0.24	0.48	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.24	0.24	2.38
19	0.24	0.24	0.00	0.00	0.48	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.24	0.00	1.43
20	0.24	0.00	0.24	0.00	0.48	0.24	0.24	0.00	0.48	0.24	0.00	0.00	0.24	0.00	0.24	0.00	2.62
21	0.00	0.00	0.24	0.24	0.71	0.48	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.14
22	0.00	0.00	0.24	0.24	0.95	0.48	0.24	0.24	0.48	0.24	0.24	0.00	0.24	0.00	0.24	0.00	3.81
23	0.71	0.00	0.24	0.48	0.24	0.00	0.48	0.48	0.24	0.00	0.00	0.24	0.00	0.48	0.48	0.24	4.29
Total	12.86	5.48	7.62	6.67	10.24	6.90	6.67	4.29	4.05	2.14	2.38	2.62	5.24	3.57	9.76	9.52	100.00

TABLE III. 12. DECEMBER (434 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.46	0.00	0.46	0.00	0.00	0.46	0.23	0.00	0.00	0.00	0.00	0.23	0.23	0.69	0.46	0.46	3.69
1	0.69	0.23	0.00	0.46	0.00	0.23	0.00	0.00	0.23	0.00	0.00	0.23	0.00	0.23	0.46	0.00	2.76
2	0.69	0.23	0.00	0.23	0.46	0.00	0.00	0.23	0.23	0.00	0.00	0.23	0.23	0.46	0.46	0.69	4.15
3	1.38	0.00	0.23	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.69	0.46	3.46
4	0.46	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.92	0.23	2.30
5	0.46	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.69	0.23	2.07
6	0.46	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.69	0.46	2.07
7	0.23	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.46	1.38
8	0.00	0.23	0.23	0.23	0.00	0.23	0.23	0.23	0.23	0.00	0.00	0.00	0.46	0.00	1.38	0.92	4.38
9	0.46	0.00	0.46	0.00	0.23	0.46	0.00	0.00	0.00	0.23	0.00	0.46	0.00	0.92	1.38	0.46	5.07
10	0.92	0.46	0.23	0.69	0.46	0.69	0.46	0.69	0.92	0.69	0.00	0.23	0.00	0.00	0.46	1.15	8.06
11	1.38	0.46	0.23	0.23	0.23	0.00	0.69	0.23	0.46	0.23	1.15	0.00	0.46	0.00	1.38	0.92	8.06
12	1.61	0.46	0.23	0.23	0.92	0.00	0.46	0.69	0.00	0.46	0.46	0.46	0.00	0.00	0.46	2.07	8.53
13	1.15	0.23	0.23	0.23	0.69	0.23	0.00	0.46	0.23	0.69	0.23	0.69	0.00	0.92	0.92	1.15	8.06
14	1.61	0.46	0.00	0.46	0.46	0.46	0.23	0.69	0.00	0.23	0.23	0.23	0.00	0.46	0.23	0.46	6.22
15	1.61	0.23	2.07	0.00	0.23	0.23	0.46	0.46	0.69	0.00	0.00	0.46	0.46	0.23	0.00	0.69	7.83
16	0.23	1.15	0.69	0.23	0.00	0.46	0.23	0.69	0.23	0.00	0.00	0.00	0.23	0.23	0.00	0.46	4.84
17	0.46	0.00	0.46	0.00	0.23	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	2.07
18	0.00	0.46	0.23	0.00	0.69	0.00	0.00	0.46	0.23	0.00	0.00	0.00	0.00	0.00	0.23	0.23	2.53
19	0.46	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	1.15
20	0.00	0.00	0.23	0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.23	1.61
21	0.46	0.00	0.00	0.00	0.23	0.00	0.69	0.23	0.46	0.46	0.00	0.00	0.00	0.69	0.00	0.00	3.23
22	0.00	0.00	0.00	0.00	0.46	0.46	0.00	0.00	0.23	0.23	0.00	0.23	0.00	0.92	0.46	0.23	3.23
23	0.23	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.46	0.23	0.92	0.23	0.46	0.00	0.23	0.00	3.23
Total	15.44	4.84	6.22	3.46	6.45	4.15	4.15	5.76	5.07	3.46	3.23	3.92	2.76	6.68	11.75	12.67	100.00

TABLE III. 13. WINTER (1263 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.32	0.00	0.40	0.08	0.32	0.24	0.24	0.16	0.24	0.08	0.24	0.16	0.24	0.40	0.48	0.32	3.88
1	0.63	0.08	0.00	0.16	0.24	0.16	0.16	0.08	0.16	0.00	0.00	0.08	0.00	0.32	0.63	0.08	2.77
2	0.63	0.16	0.16	0.08	0.16	0.08	0.08	0.16	0.16	0.00	0.24	0.24	0.32	0.48	0.48	0.40	3.80
3	0.63	0.00	0.24	0.00	0.08	0.08	0.08	0.00	0.08	0.16	0.00	0.08	0.08	0.16	0.55	0.40	2.61
4	0.32	0.08	0.08	0.00	0.08	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.16	0.32	0.71	0.55	2.45
5	0.40	0.00	0.16	0.08	0.00	0.08	0.08	0.00	0.08	0.00	0.00	0.00	0.00	0.16	0.71	0.16	1.90
6	0.32	0.00	0.08	0.00	0.08	0.08	0.00	0.00	0.08	0.00	0.16	0.08	0.16	0.08	0.63	0.48	2.22
7	0.32	0.08	0.24	0.16	0.08	0.16	0.16	0.08	0.00	0.00	0.00	0.00	0.08	0.08	0.48	0.32	2.22
8	0.16	0.08	0.08	0.08	0.08	0.16	0.16	0.08	0.08	0.00	0.00	0.00	0.16	0.16	0.79	0.55	2.61
9	0.32	0.00	0.16	0.08	0.32	0.16	0.00	0.08	0.08	0.16	0.08	0.24	0.16	0.48	0.71	0.55	3.56
10	1.19	0.32	0.08	0.32	0.24	0.48	0.40	0.32	0.63	0.40	0.71	0.24	0.32	0.32	0.63	0.55	7.13
11	1.58	0.48	0.32	0.16	0.32	0.32	0.40	0.16	0.55	0.32	0.71	0.40	0.63	0.32	1.11	0.95	8.71
12	1.03	0.63	0.79	0.24	0.55	0.24	0.40	0.48	0.79	0.48	0.79	0.40	0.16	0.16	0.48	1.35	8.95
13	1.43	0.48	0.16	0.16	0.40	0.63	0.63	0.55	0.24	0.95	0.40	0.55	0.08	0.79	0.48	0.87	8.79
14	1.43	0.63	0.24	0.24	0.71	0.32	0.79	0.87	0.24	0.16	0.63	0.32	0.24	0.32	0.16	0.40	7.68
15	1.27	0.40	0.87	0.32	0.40	0.24	1.50	0.79	0.24	0.16	0.32	0.63	0.40	0.63	0.24	0.40	8.79
16	0.95	0.79	0.55	0.08	0.32	0.24	0.71	0.63	0.08	0.08	0.08	0.00	0.32	0.24	0.08	0.32	5.46
17	0.63	0.24	0.32	0.00	0.24	0.08	0.48	0.16	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.24	2.53
18	0.08	0.16	0.16	0.08	0.24	0.08	0.24	0.24	0.16	0.00	0.00	0.00	0.08	0.00	0.08	0.16	1.74
19	0.16	0.00	0.00	0.16	0.16	0.08	0.32	0.24	0.00	0.08	0.00	0.08	0.08	0.08	0.08	0.24	1.74
20	0.08	0.16	0.08	0.00	0.08	0.16	0.16	0.55	0.16	0.00	0.00	0.08	0.16	0.08	0.08	0.08	1.90
21	0.24	0.08	0.00	0.16	0.24	0.00	0.32	0.32	0.24	0.16	0.00	0.00	0.16	0.32	0.24	0.16	2.61
22	0.24	0.00	0.00	0.00	0.40	0.40	0.24	0.00	0.32	0.24	0.00	0.24	0.24	0.48	0.24	0.16	3.17
23	0.16	0.00	0.00	0.00	0.24	0.00	0.16	0.00	0.40	0.24	0.55	0.08	0.40	0.24	0.32	0.00	2.77
Total	14.49	4.83	5.15	2.61	5.94	4.43	7.68	5.94	5.15	3.64	4.99	3.88	4.59	6.57	10.45	9.66	100.00

TABLE III. 14. SPRING (1288 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.31	0.16	0.16	0.16	0.23	0.31	0.23	0.00	0.16	0.16	0.31	0.16	0.31	0.08	0.00	0.31	3.03
1	0.23	0.16	0.16	0.00	0.23	0.16	0.08	0.08	0.08	0.23	0.08	0.00	0.08	0.16	0.16	0.08	1.94
2	0.08	0.16	0.23	0.08	0.16	0.23	0.00	0.00	0.16	0.23	0.08	0.00	0.31	0.08	0.31	0.08	2.17
3	0.23	0.08	0.08	0.08	0.08	0.00	0.16	0.00	0.16	0.08	0.00	0.00	0.08	0.23	0.00	0.08	1.32
4	0.16	0.00	0.00	0.00	0.08	0.23	0.08	0.00	0.00	0.00	0.08	0.08	0.00	0.08	0.23	0.16	1.16
5	0.08	0.00	0.16	0.08	0.00	0.00	0.08	0.00	0.08	0.23	0.08	0.16	0.00	0.00	0.23	0.08	1.24
6	0.16	0.00	0.00	0.16	0.23	0.08	0.00	0.00	0.00	0.16	0.08	0.00	0.00	0.00	0.31	0.08	1.24
7	0.31	0.23	0.08	0.23	0.08	0.08	0.16	0.16	0.00	0.00	0.16	0.08	0.16	0.08	0.08	0.23	2.10
8	0.31	0.08	0.00	0.08	0.31	0.16	0.16	0.00	0.08	0.00	0.16	0.00	0.16	0.23	0.47	0.31	2.48
9	0.31	0.16	0.08	0.23	0.39	0.31	0.39	0.31	0.23	0.39	0.16	0.00	0.08	0.08	0.47	1.01	4.58
10	0.54	0.47	0.31	0.39	0.54	0.47	0.31	0.23	0.08	0.23	0.23	0.16	0.08	0.39	0.47	0.23	5.12
11	1.24	0.31	0.39	0.16	0.47	0.54	0.62	0.31	0.31	0.16	0.08	0.16	0.31	0.47	0.23	0.08	5.82
12	0.70	0.47	0.54	0.39	0.85	1.09	0.47	0.00	0.31	0.16	0.23	0.47	0.47	0.23	0.16	0.16	6.68
13	1.01	0.70	0.78	0.47	1.01	0.70	1.48	0.85	0.16	0.23	0.47	0.23	0.54	0.16	0.00	0.31	9.08
14	0.93	0.78	0.54	0.62	1.24	1.16	1.40	0.78	0.23	0.31	0.39	0.23	0.70	0.39	0.23	0.39	10.33
15	0.70	0.62	0.78	0.47	1.16	1.55	2.48	0.78	0.31	0.08	0.08	0.23	0.54	0.39	0.08	0.31	10.56
16	0.31	0.23	0.70	0.08	0.70	0.78	2.02	0.85	0.31	0.08	0.16	0.16	0.31	0.16	0.23	0.23	7.30
17	0.31	0.16	0.23	0.47	0.78	0.54	1.63	1.01	0.16	0.08	0.16	0.16	0.31	0.08	0.00	0.00	6.06
18	0.16	0.08	0.16	0.08	0.23	0.70	0.62	0.78	0.16	0.08	0.08	0.08	0.39	0.00	0.08	0.08	3.73
19	0.31	0.08	0.00	0.16	0.31	0.31	0.93	1.01	0.16	0.08	0.00	0.31	0.08	0.00	0.16	0.00	3.88
20	0.23	0.08	0.00	0.08	0.23	0.08	0.23	0.70	0.00	0.08	0.16	0.16	0.16	0.00	0.08	0.00	2.25
21	0.16	0.08	0.08	0.16	0.39	0.54	0.23	0.39	0.47	0.00	0.00	0.08	0.16	0.00	0.00	0.08	2.80
22	0.00	0.16	0.08	0.08	0.31	0.08	0.39	0.31	0.47	0.00	0.00	0.08	0.08	0.23	0.16	0.00	2.41
23	0.08	0.08	0.08	0.23	0.23	0.23	0.62	0.31	0.08	0.08	0.16	0.08	0.23	0.00	0.08	0.16	2.72
Total	8.85	5.28	5.59	4.89	10.25	10.33	14.75	8.85	4.11	3.11	3.34	3.03	5.51	3.49	4.19	4.43	100.00

TABLE III. 15. SUMMER (1288 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.00	0.00	0.00	0.00	0.16	0.23	0.16	0.08	0.00	0.16	0.00	0.00	0.08	0.08	0.08	0.08	1.09
1	0.00	0.00	0.00	0.08	0.31	0.00	0.08	0.47	0.00	0.16	0.08	0.08	0.08	0.00	0.00	0.00	1.32
2	0.00	0.00	0.08	0.08	0.00	0.31	0.08	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.08	0.78
3	0.00	0.00	0.08	0.00	0.23	0.08	0.08	0.08	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.62
4	0.00	0.23	0.00	0.00	0.08	0.00	0.23	0.00	0.08	0.08	0.00	0.16	0.00	0.00	0.08	0.00	0.93
5	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.08	0.00	0.31
6	0.00	0.00	0.00	0.00	0.16	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.39
7	0.00	0.08	0.00	0.00	0.08	0.23	0.00	0.16	0.08	0.08	0.00	0.00	0.00	0.08	0.31	0.00	1.09
8	0.16	0.08	0.00	0.08	0.08	0.23	0.31	0.00	0.16	0.16	0.00	0.08	0.16	0.16	0.00	0.00	1.63
9	0.00	0.00	0.16	0.16	0.23	0.08	0.08	0.16	0.16	0.00	0.16	0.00	0.16	0.08	0.08	0.08	1.55
10	0.23	0.31	0.47	0.08	0.31	0.54	0.47	0.54	0.16	0.00	0.08	0.00	0.23	0.08	0.08	0.16	3.73
11	0.08	0.54	0.54	0.54	0.93	0.39	0.23	0.39	0.39	0.16	0.47	0.16	0.23	0.00	0.08	0.00	5.12
12	0.23	0.39	0.62	0.47	1.16	0.54	1.09	0.47	0.62	0.08	0.16	0.47	0.23	0.31	0.23	0.00	7.07
13	0.23	0.54	1.09	0.93	1.63	1.63	1.79	0.62	0.08	0.23	0.54	0.16	0.85	0.31	0.00	0.23	10.87
14	0.31	0.16	1.01	1.40	2.72	2.17	2.56	0.54	0.47	0.23	0.31	0.23	0.62	0.47	0.39	0.16	13.74
15	0.54	0.31	0.70	0.31	2.41	2.33	3.34	1.09	0.47	0.23	0.47	0.47	0.16	0.31	0.16	0.23	13.51
16	0.23	0.31	0.54	0.23	1.63	2.33	2.56	1.55	0.54	0.39	0.70	0.23	0.31	0.54	0.39	0.23	12.73
17	0.16	0.00	0.39	0.16	0.39	1.55	2.56	1.48	0.78	0.23	0.47	0.39	0.31	0.31	0.39	0.31	9.86
18	0.31	0.00	0.16	0.08	0.39	0.47	1.24	0.47	0.78	0.00	0.47	0.31	0.16	0.00	0.08	0.08	4.97
19	0.00	0.00	0.16	0.23	0.16	0.23	0.16	0.54	0.47	0.47	0.16	0.00	0.31	0.08	0.00	0.16	3.11
20	0.23	0.00	0.08	0.08	0.16	0.23	0.31	0.16	0.08	0.16	0.08	0.23	0.08	0.08	0.00	0.00	1.94
21	0.00	0.00	0.23	0.16	0.08	0.00	0.39	0.23	0.08	0.08	0.23	0.08	0.00	0.08	0.00	0.00	1.63
22	0.00	0.00	0.00	0.08	0.08	0.16	0.23	0.08	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.78
23	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.08	0.39	0.16	0.08	0.00	0.00	0.16	0.08	0.00	1.24
Total	2.72	3.03	6.29	5.12	13.35	14.13	18.01	9.16	5.82	3.11	4.66	3.18	3.96	3.18	2.48	1.79	100.00

TABLE III. 16. FALL (1274 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.24	0.31	0.31	0.71	0.55	0.71	0.47	0.16	0.16	0.00	0.00	0.08	0.08	0.08	0.39	0.24	4.47
1	0.00	0.16	0.16	0.63	0.86	0.55	0.24	0.00	0.16	0.00	0.08	0.08	0.08	0.08	0.31	0.08	3.45
2	0.08	0.08	0.16	0.16	0.24	0.08	0.08	0.08	0.00	0.00	0.24	0.16	0.16	0.00	0.16	0.24	1.88
3	0.47	0.08	0.24	0.08	0.16	0.16	0.16	0.16	0.16	0.08	0.16	0.00	0.08	0.08	0.00	0.24	2.28
4	0.24	0.16	0.16	0.24	0.08	0.24	0.00	0.08	0.00	0.16	0.00	0.00	0.16	0.16	0.24	0.55	2.43
5	0.00	0.24	0.31	0.31	0.24	0.08	0.16	0.08	0.00	0.00	0.00	0.08	0.08	0.00	0.08	0.08	1.73
6	0.08	0.00	0.47	0.16	0.08	0.24	0.16	0.08	0.08	0.00	0.00	0.08	0.16	0.00	0.16	0.08	1.81
7	0.24	0.16	0.08	0.00	0.47	0.39	0.08	0.16	0.08	0.00	0.00	0.08	0.08	0.08	0.31	0.24	2.43
8	0.24	0.16	0.39	0.39	0.39	0.08	0.08	0.08	0.00	0.00	0.24	0.00	0.08	0.00	0.00	0.08	2.20
9	0.24	0.31	0.47	0.24	0.47	0.55	0.24	0.16	0.00	0.00	0.16	0.00	0.00	0.08	0.55	0.24	3.69
10	0.24	0.55	0.31	0.31	1.02	0.24	0.31	0.16	0.31	0.24	0.00	0.00	0.31	0.16	0.31	0.24	4.71
11	0.55	0.47	1.10	0.47	0.55	0.24	0.24	0.16	0.08	0.31	0.16	0.08	0.47	0.31	0.71	0.63	6.51
12	1.26	0.78	1.10	0.71	0.55	0.47	0.47	0.08	0.24	0.16	0.31	0.55	0.31	0.31	0.24	0.39	7.93
13	1.96	0.55	1.02	0.71	1.26	0.78	0.71	0.31	0.31	0.24	0.24	0.16	0.39	0.24	0.47	0.55	9.89
14	1.33	0.55	0.78	0.16	1.10	0.55	0.86	0.39	0.39	0.00	0.08	0.16	0.47	0.24	0.16	0.55	7.77
15	1.26	0.86	0.71	0.71	1.10	0.78	0.08	0.31	0.24	0.16	0.31	0.16	0.31	0.31	0.24	0.47	8.01
16	1.02	0.31	0.78	0.47	1.02	0.63	0.71	0.47	0.24	0.00	0.16	0.00	0.31	0.00	0.24	0.08	6.44
17	0.47	0.24	0.24	0.24	0.63	0.39	0.31	0.55	0.16	0.00	0.16	0.08	0.16	0.08	0.08	0.31	4.08
18	0.47	0.08	0.31	0.24	0.31	0.24	0.47	0.31	0.00	0.16	0.08	0.16	0.00	0.08	0.08	0.08	3.06
19	0.16	0.39	0.24	0.24	0.55	0.24	0.31	0.24	0.08	0.08	0.00	0.00	0.08	0.08	0.16	0.16	2.98
20	0.24	0.16	0.16	0.16	0.55	0.08	0.08	0.31	0.16	0.16	0.08	0.00	0.16	0.08	0.08	0.00	2.43
21	0.08	0.16	0.47	0.39	0.63	0.47	0.47	0.08	0.08	0.00	0.16	0.08	0.08	0.00	0.08	0.16	3.38
22	0.00	0.08	0.39	0.24	0.71	0.31	0.31	0.47	0.16	0.08	0.08	0.00	0.16	0.00	0.16	0.00	3.14
23	0.31	0.00	0.39	0.31	0.55	0.39	0.24	0.16	0.24	0.24	0.00	0.08	0.00	0.16	0.16	0.08	3.30
Total	11.15	6.83	10.75	8.24	14.05	8.87	7.22	5.02	3.30	2.04	2.67	2.04	4.16	2.59	5.34	5.73	100.00

TABLE III. 17. ANNUAL (5113 Observations)

HOUR	DIRECTION																
(LST)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0	0.22	0.12	0.22	0.23	0.31	0.37	0.27	0.10	0.14	0.10	0.14	0.10	0.18	0.16	0.23	0.23	3.11
1	0.22	0.10	0.08	0.22	0.41	0.22	0.14	0.16	0.10	0.10	0.06	0.06	0.06	0.14	0.27	0.06	2.37
2	0.20	0.10	0.16	0.10	0.14	0.18	0.06	0.06	0.08	0.06	0.16	0.12	0.20	0.14	0.23	0.20	2.15
3	0.33	0.04	0.16	0.04	0.14	0.08	0.12	0.06	0.10	0.08	0.06	0.02	0.06	0.12	0.14	0.18	1.70
4	0.18	0.12	0.06	0.06	0.08	0.12	0.08	0.02	0.04	0.06	0.04	0.06	0.08	0.14	0.31	0.31	1.74
5	0.12	0.08	0.16	0.12	0.06	0.04	0.08	0.02	0.04	0.06	0.04	0.08	0.02	0.04	0.27	0.08	1.29
6	0.14	0.00	0.14	0.08	0.14	0.12	0.06	0.02	0.04	0.04	0.06	0.04	0.08	0.04	0.27	0.16	1.41
7	0.22	0.14	0.10	0.10	0.18	0.22	0.10	0.14	0.04	0.02	0.04	0.04	0.08	0.08	0.29	0.20	1.96
8	0.22	0.10	0.12	0.16	0.22	0.16	0.18	0.04	0.08	0.04	0.10	0.02	0.14	0.14	0.31	0.23	2.23
9	0.22	0.12	0.22	0.18	0.35	0.27	0.18	0.18	0.12	0.14	0.14	0.06	0.10	0.18	0.45	0.47	3.34
10	0.55	0.41	0.29	0.27	0.53	0.43	0.37	0.31	0.29	0.22	0.25	0.10	0.23	0.23	0.37	0.29	5.16
11	0.86	0.45	0.59	0.33	0.57	0.37	0.37	0.25	0.33	0.23	0.35	0.20	0.41	0.27	0.53	0.41	6.53
12	0.80	0.57	0.76	0.45	0.78	0.59	0.61	0.25	0.49	0.22	0.37	0.47	0.29	0.25	0.27	0.47	7.65
13	1.15	0.57	0.76	0.57	1.08	0.94	1.15	0.59	0.20	0.41	0.41	0.27	0.47	0.37	0.23	0.49	9.66
14	1.00	0.53	0.65	0.61	1.45	1.06	1.41	0.65	0.33	0.18	0.35	0.23	0.51	0.35	0.23	0.37	9.90
15	0.94	0.55	0.76	0.45	1.27	1.23	1.86	0.74	0.31	0.16	0.29	0.37	0.35	0.41	0.18	0.35	10.23
16	0.63	0.41	0.65	0.22	0.92	1.00	1.51	0.88	0.29	0.14	0.27	0.10	0.31	0.23	0.23	0.22	8.00
17	0.39	0.16	0.29	0.22	0.51	0.65	1.25	0.80	0.29	0.08	0.20	0.16	0.20	0.12	0.14	0.22	5.65
18	0.25	0.08	0.20	0.12	0.29	0.37	0.65	0.45	0.27	0.06	0.16	0.14	0.16	0.02	0.08	0.10	3.38
19	0.16	0.12	0.10	0.20	0.29	0.22	0.43	0.51	0.18	0.18	0.04	0.10	0.14	0.06	0.10	0.14	2.93
20	0.20	0.10	0.08	0.08	0.25	0.14	0.20	0.43	0.10	0.10	0.08	0.12	0.14	0.06	0.06	0.02	2.13
21	0.12	0.08	0.20	0.22	0.33	0.25	0.35	0.25	0.22	0.06	0.10	0.06	0.10	0.10	0.08	0.10	2.60
22	0.06	0.06	0.12	0.10	0.37	0.23	0.29	0.22	0.25	0.10	0.02	0.08	0.12	0.18	0.14	0.04	2.37
23	0.14	0.02	0.12	0.14	0.25	0.23	0.25	0.14	0.27	0.18	0.20	0.08	0.16	0.14	0.16	0.06	2.50
Total	9.27	4.99	6.94	5.22	10.91	9.47	11.95	7.26	4.60	2.97	3.91	3.03	4.56	3.95	5.59	5.38	100.00

DAILY PEAK SURFACE WIND
CAPE KENNEDY, FLORIDA
FEBRUARY 1950 - JANUARY 1964

FIGURE I: EXPOSURE PERIOD PROBABILITIES

I. 1	January
I. 2	February
I. 3	March
I. 4	April
I. 5	May
I. 6	June
I. 7	July
I. 8	August
I. 9	September
I. 10	October
I. 11	November
I. 12	December
I. 13	Winter
I. 14	Spring
I. 15	Summer
I. 16	Fall
I. 17	Annual

DESCRIPTION: Figure I presents probabilities, expressed in percent, that a daily peak surface wind speed will equal or exceed selected values during exposure periods of one day through thirty consecutive days.

Abscissa values are consecutive days of exposure and refer to exposure periods beginning on any day of the indicated calendar period.

Ordinate values $P(W \geq W^*)$ give the percentage probability (percentage relative frequency) that during an exposure period a daily peak wind speed (W) will equal or exceed the value (W^*) specified by one of the curves. For an exposure period of one day, the probability $100 - P(W \geq W^*)$ corresponds to that given in the Cumulative Total column of Tables I and II.

Probabilities were computed for the speed values (W^*) 2.6, 5.1, 7.7, 10.3, 12.9, 15.4, 18.0, 20.6, 23.2, 25.7, 28.3, 30.9, and 36.0 m/sec (5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, and 70 knots) and for 1, 2, 3, 4, 5, 10, 15, 20, 25, and 30 days of exposure. These values were plotted and a free-hand curve drawn through points of equal W^*.

To allow exposure periods of 30 days to begin on the last day of January, daily peak wind speeds for February 1, 1964 through March 1, 1964 were added to the data sample. The observation for February 29 was deleted for each of the years 1952, 1956, 1960 and 1964.

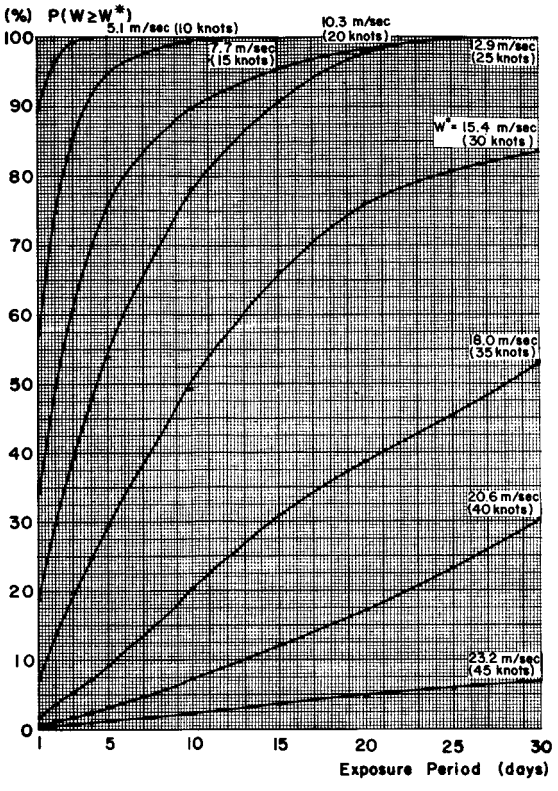


Fig. I.1. January (434 Observations)

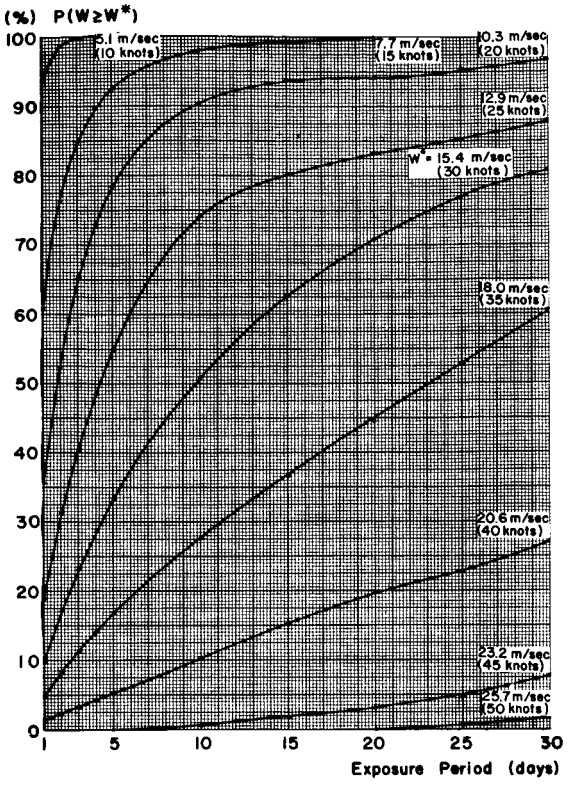


Fig. I.2. February (392 Observations)

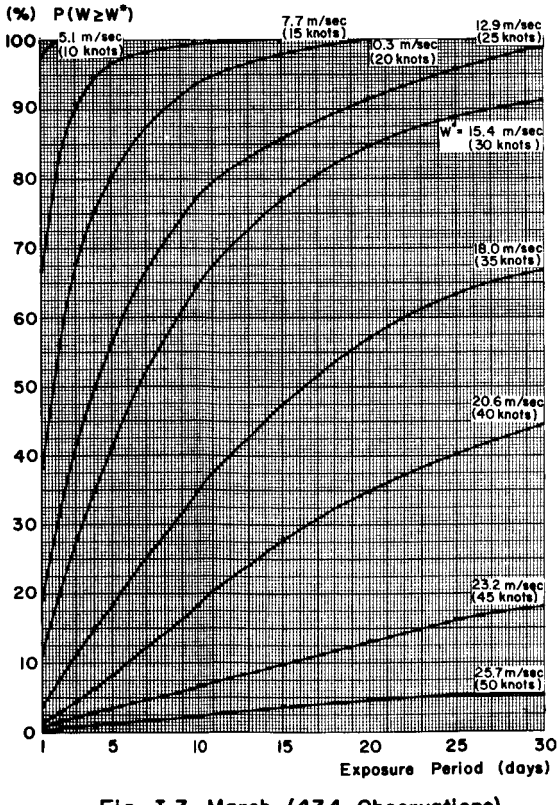


Fig. I.3. March (434 Observations)

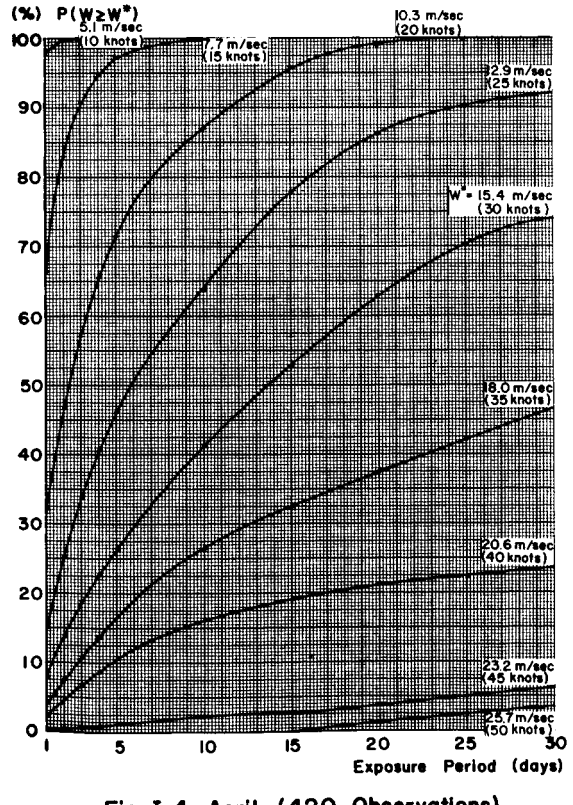


Fig. I.4. April (420 Observations)

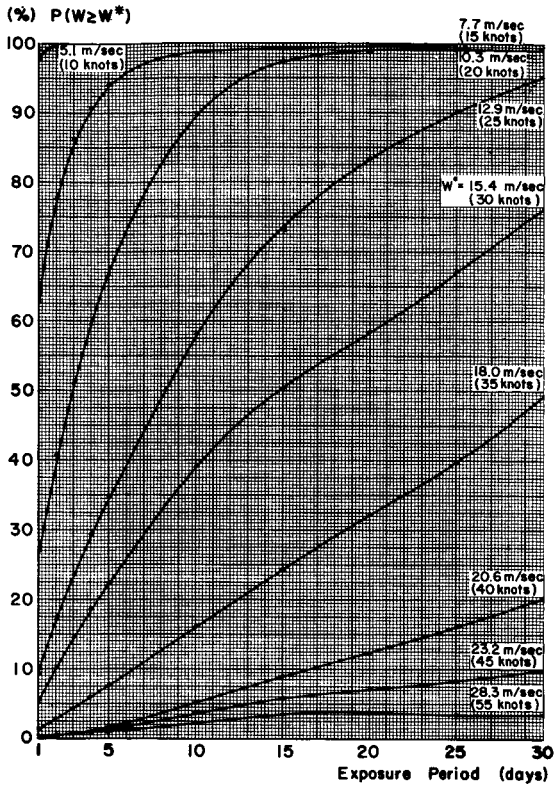


Fig. I.5. May (434 Observations)

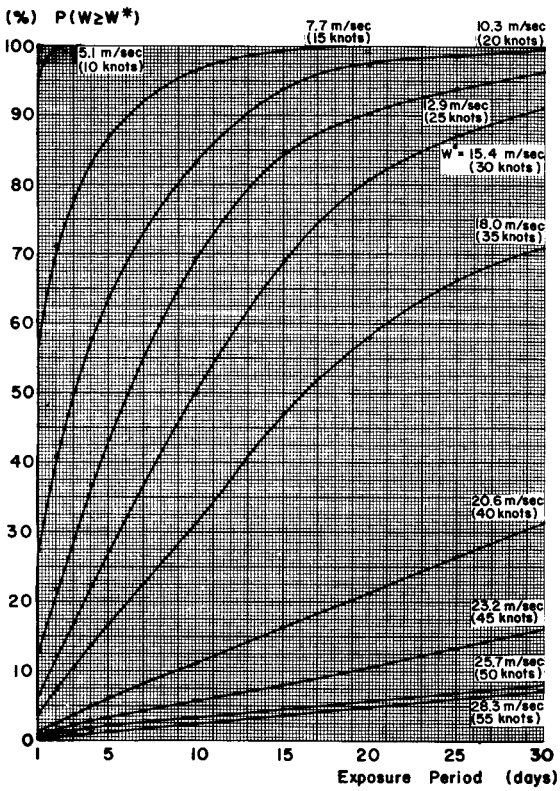


Fig. I.6. June (420 Observations)

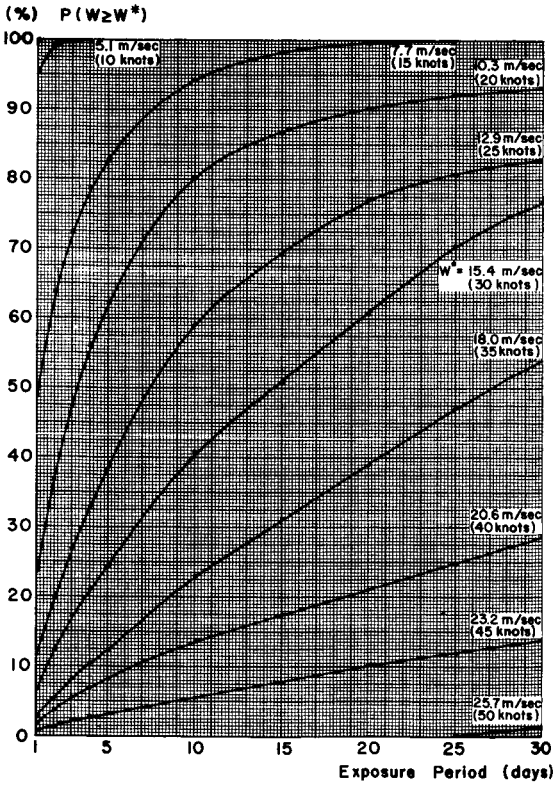


Fig. I.7. July (434 Observations)

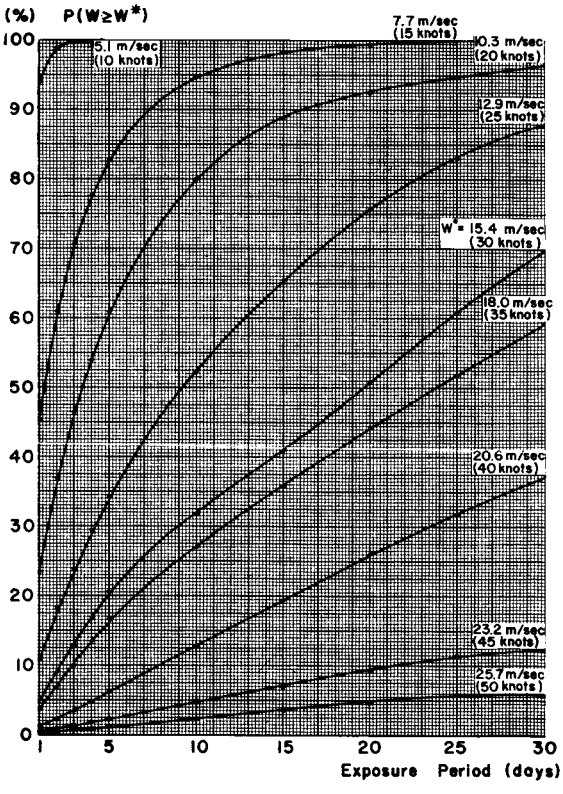


Fig. I.8. August (434 Observations)

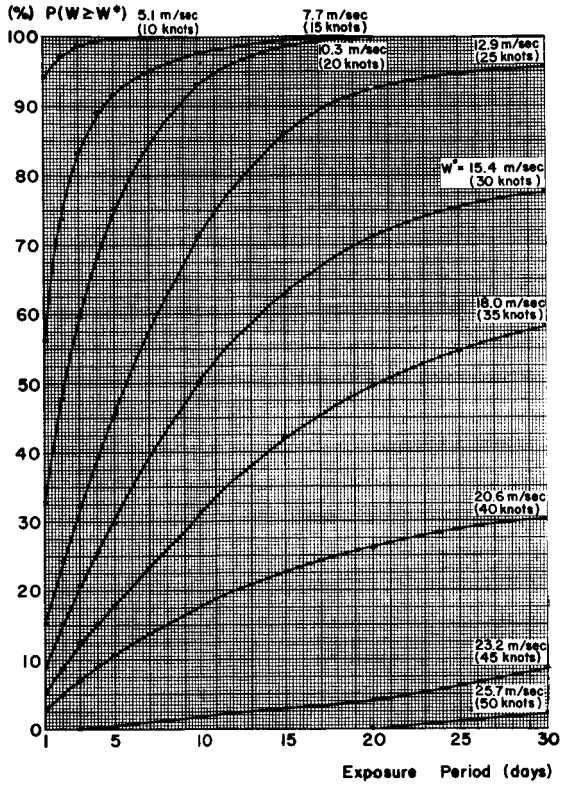


Fig. I. 9. September (420 Observations)

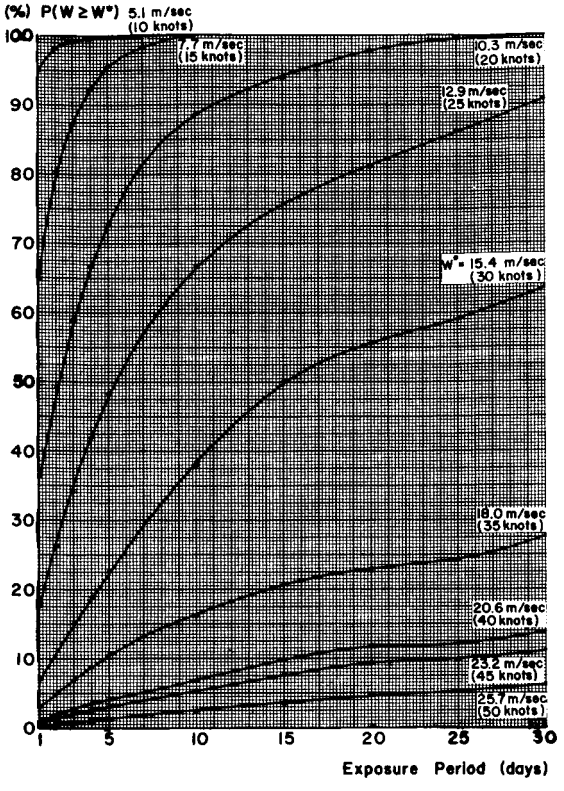


Fig. I. 10. October (434 Observations)

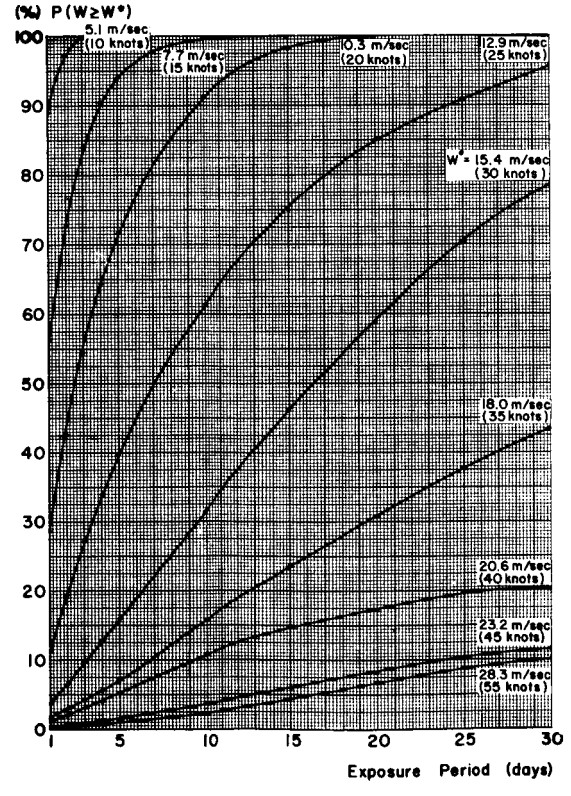


Fig. I. 11 November (420 Observations)

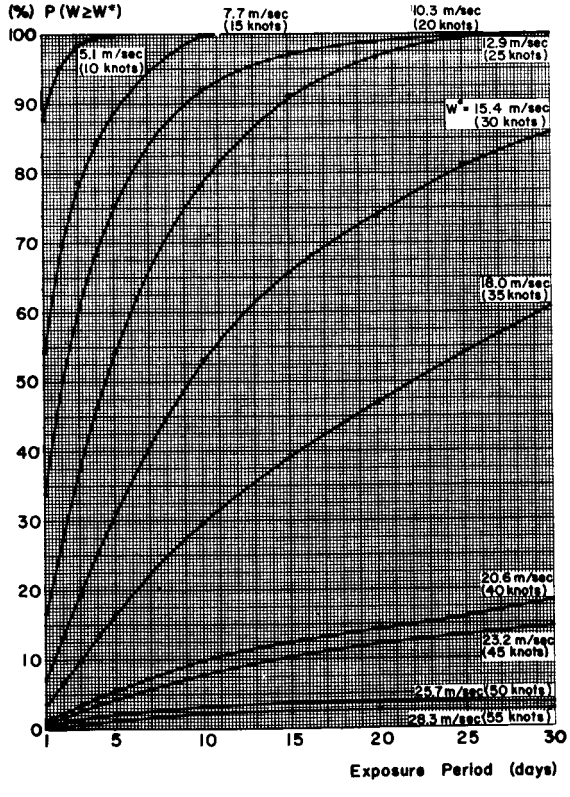


Fig. I. 12. December (434 Observations)

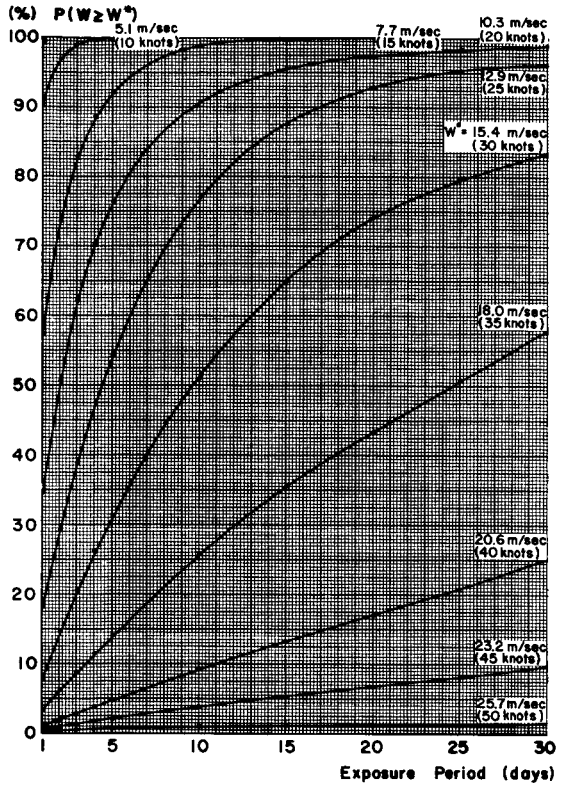


Fig. I.13. Winter (1260 Observations)

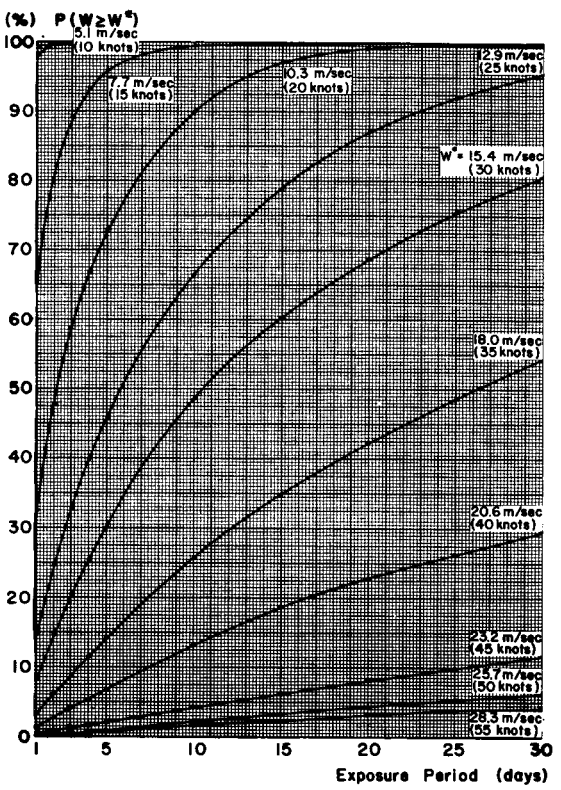


Fig. I. 14. Spring (1288 Observations)

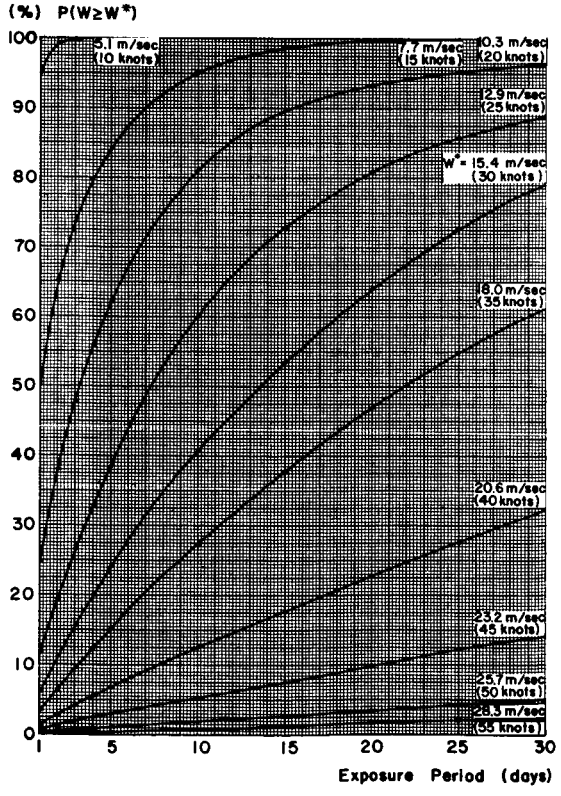


Fig. I. 15. Summer (1288 Observations)

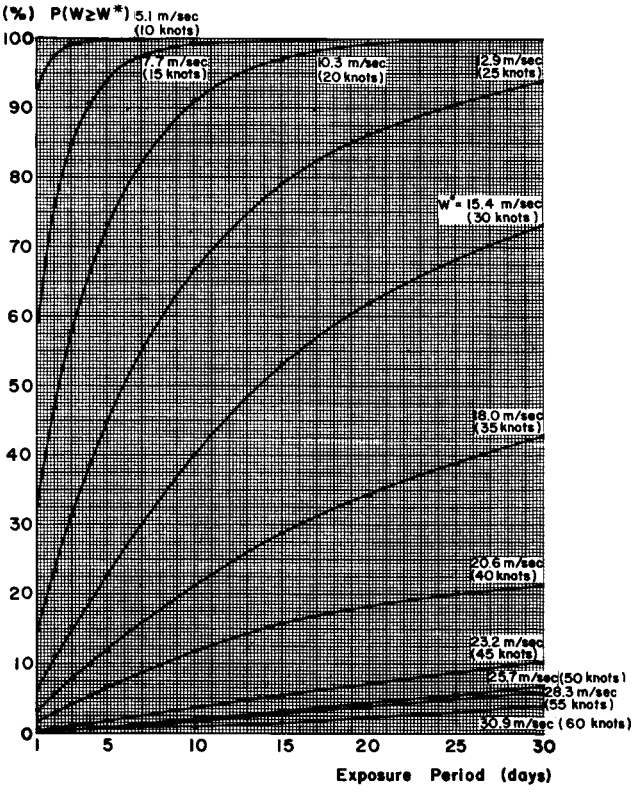


Fig. I. 16. Fall (1274 Observations)

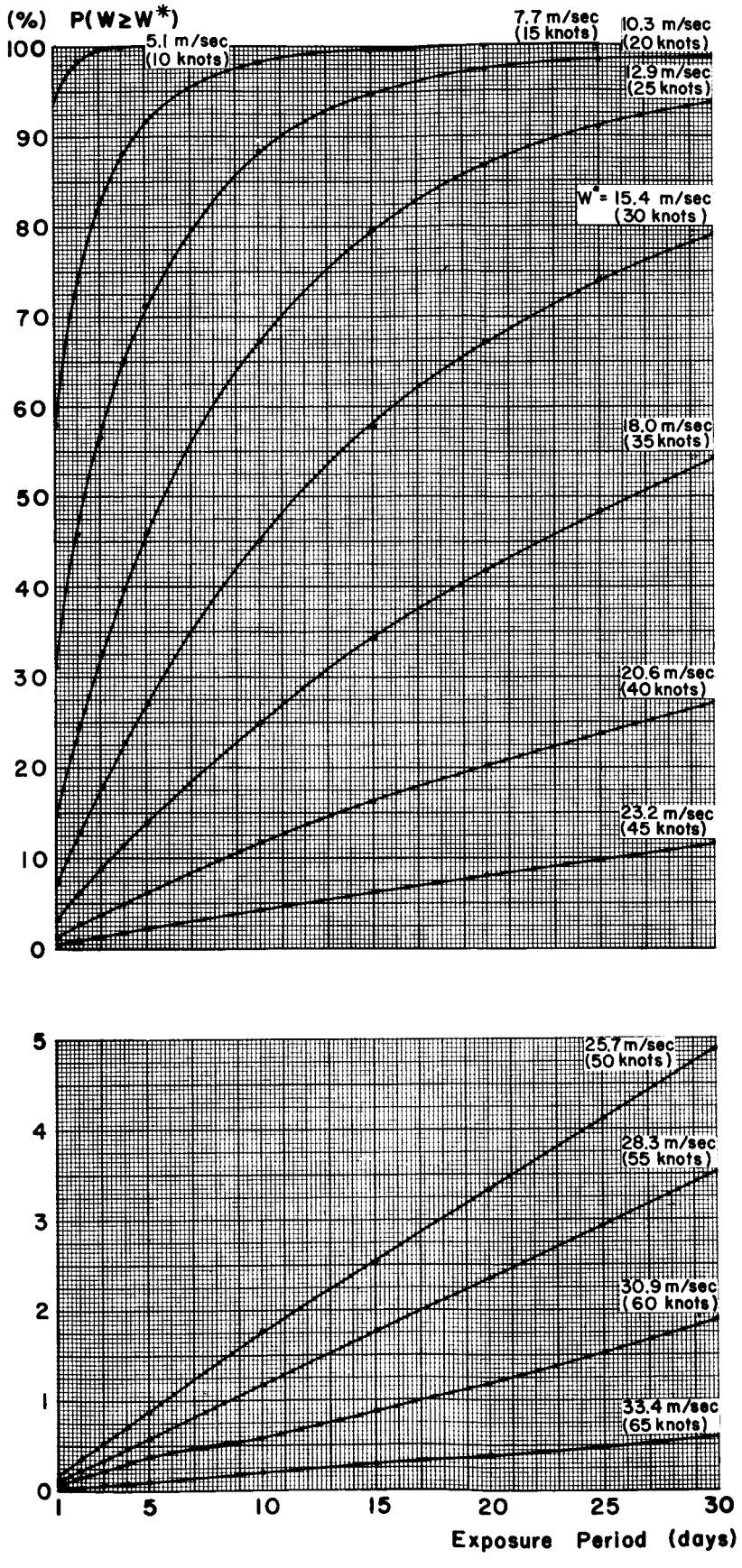


Fig. I.17. Annual (5110 Observations)

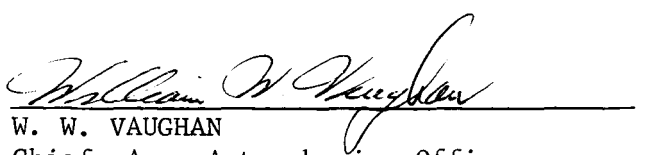
AN EMPIRICAL ANALYSIS OF DAILY PEAK SURFACE WIND AT CAPE KENNEDY, FLORIDA FOR PROJECT APOLLO

By J. David Lifsey

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.

O. E. SMITH
Chief, Terrestrial Environment Group



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